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# GRASS VARIETIES

in the

UNITED STATES + 3a

7a  
Agriculture Handbook No. 170))

5b  
Agricultural Research Service  
UNITED STATES DEPARTMENT OF AGRICULTURE

5a  
Washington, D.C.

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Revised June 1965 5a

# GRASS VARIETIES IN THE UNITED STATES

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This handbook has been prepared as a reference for technical workers interested in the origin and current status of named and experimental grass varieties in the United States. Information on source material, previous names or experimental numbers, characteristics ascribed to varieties by originating stations, and seed supplies has not been previously available in a readily accessible form.

At least 90 grasses are used to some extent on most farms in the United States either for forage or for conservation and soil improvement. In addition, the forage grasses are utilized on 400 million acres of open grazing land and woodland ranges that are not on farms. The grasses provide about 48 percent of the total livestock feed requirements as pasture and about 12 percent as hay. Grasses for turf in lawns, parks, playgrounds, airports, cemeteries, roadsides, golf courses, and other uses occupy more than 14 million acres and affect almost the entire population of the country.

Most of our major grasses have been introduced—a process that started with early pioneer settlements along the borders of what is now the continental United States. Chance introductions were followed in time by organized plant explorations sponsored by the U.S. Department of Agriculture (USDA), as well as by the direct exchange of seed and plant material between American and foreign research workers. It would be impracticable to attempt to list all the organizations and individuals that have participated in bringing promising new grasses and grass varieties to the United States. However, one would be remiss if he failed to acknowledge the exploration work conducted by the former Division of Plant Exploration and Introduction, USDA. In addition, special mention should be made of the early and effective introduction programs conducted by several State agricultural experiment stations, particularly those in California, Florida, and Texas.

Certain individuals, because of their professional stature and personal contacts, did much to bring new grasses to the United States and to encourage their evaluation. Leaders in this field include C. V. Piper, H. N. Vinall, G. E. Ritchey, and H. L. Westover of the former Bureau of Plant Industry, and C. R. Enlow and F. J. Crider of the former Nursery Division of the Soil Conservation Service (SCS), USDA.

The amount of effort devoted to improving any one grass species is very limited in comparison with that applied to most cultivated crops. In addition, many early attempts to select superior grass varieties fell short of expectation, partly because of the lack of specific information on the species in question, including mode of reproduction, breeding behavior, physiological response under various systems of management, animal acceptance, nutritive value, and the relative significance of disease and insect attack. Applied grass-breeding work is advancing with the accumulated basic information in cytology, genetics, pathology, and physiology, but much remains to be done. Many of the grass-breeding procedures and techniques summarized by Hanson and Carnahan<sup>1</sup> cannot be properly evaluated on the basis of existing data. However, it is certain that the accumulation of basic information and additional introduction work will continue to be important considerations in providing American farmers, ranchers, and homeowners with new and better grass varieties.

An attempt has been made in this handbook to limit entries to those varieties and experimental strains that have been distributed rather widely for testing purposes. Although several experimental strains (e.g., Utah Synthetic, Washington 88, and Pasture Laboratory synthetic orchard-grasses) are no longer extant, they are included for reference purposes because of their wide distribution in regional tests and their possible inclusion as source material in current breeding programs. The same is true of several named varieties that are no longer available (e.g., Hopkins and Huron timothy). Identified sources that were of local significance only and have subsequently become unavailable are not included in the revision (e.g., Sand strain of western wheatgrass and Michigan B-2 smooth brome). Information is included on foreign grass varieties that have been distributed either through the regional testing program of the Grass and Turf Investigations project, USDA, or by commercial seed companies.

There are numerous collections of both native and introduced grasses maintained at State agri-

<sup>1</sup> Hanson, A. A., and Carnahan, H. L. Breeding Perennial Forage Grasses. U.S. Dept. Agr. Tech. Bul. 1145, 116 pp. 1956.

cultural experiment stations and Plant Materials Centers in the United States. Insofar as possible all major identifiable sources, strains, and varieties are included, except those for which more information is needed to establish the characteristics and potential value of the source in question. Identifiable sources omitted from the revision include *Calamovilfa longifolia* (Hook.) Scribn., 'Bowman' (Plant Materials Center, SCS, Bismarck, N. Dak.); *Echinochloa crusgalli* Beauv., P-14945, P-14946, and P-14948 (selected at Plant Materials Center, SCS, Pleasanton, Calif., as waterfowl food plants); and *Festuca arizonica* Vasey, PM-NM-5, *Muhlenbergia wrightii* Vasey, PM-NM-199, and *Oryzopsis hymenoides* (Roem. and Schult.) Ricker, PM-NM-168 (Plant Materials Center, SCS, Los Lunas, N. Mex.).

Brief descriptions of the major grasses for forage, turf, and erosion control have been added, primarily as an aid in determining the availability of varieties and experimental strains. Registration numbers appearing in the text are assigned under a memorandum of understanding between the Crops Research Division, Agricultural Research Service (ARS), and the American Society of Agronomy. Registration provides a permanent record of names and distinctive characteristics of crop varieties and does not necessarily mean that a given variety is superior in any or all respects. Grasses have been registered under the following categories: Bentgrasses, bermudagrasses, bluegrasses, brome-grasses, fescues, gramagrasses, orchardgrasses, other grasses, *Paspalum* spp., sorghums, timothy, and wheatgrasses.

Since introductions are often grown at more than one experiment station, it is frequently diffi-

cult to assign credit to any one individual or group. Insofar as possible an attempt has been made to recognize those individuals and agencies that have taken the initiative in increasing and distributing specific strains.

No attempt has been made to appraise the relative merits of the grass varieties included in this handbook. Several of the varieties are obsolete, and others have failed to exhibit any particular promise in comparative tests.

Breeder seed has been defined by seed certification agencies and is a term used by plant breeders in various ways, but for the purpose of this handbook it serves only to indicate the source of stock seed.

Some varieties have not been included in seed certification programs, and where this is true an attempt has been made to indicate whether or not noncertified seed is being produced. The most effective system for maintaining the characteristics of a grass variety in commercial seed production is seed certification. Many grass varieties should be certified on a limited generation basis. The practice of continuing varieties by recertifying certified seed indefinitely can lead to serious changes in type. The originating or sponsoring station and the certifying agency must assume the responsibility of developing production practices and adequate control measures for the maintenance of a given variety.

Grateful acknowledgment is made for the cooperation of grass specialists associated with State agricultural experiment stations, the Agricultural Research Service, the Soil Conservation Service, and the Canada Department of Agriculture in submitting material for this handbook.

### ***Agropyron cristatum* (L.) Gaertn., fairway wheatgrass (also crested wheatgrass)**

Important cool-season bunchgrass from Siberia. First distributed in 1927 in Saskatchewan, Canada, and later identified as Fairway variety of crested wheatgrass. Used extensively for pasture and hay in western Canada and to more limited extent in northern Great Plains and intermountain region of United States. Fairway is shorter, denser, finer stemmed, and less productive than crested, but better suited for dryland lawns and general-purpose turf.

#### **NEBRASKA 3576**

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell.

*Source.*—Commercial lots and experiment station accessions of fairway wheatgrass collected in 1936-38.

*Method of Breeding.*—Selection of space-planted clones carried on through three successive

generations. Seed from superior plants composited and increased.

*Description.*—Early-maturing, cool-season grass. Very leafy and productive of both forage and seed. In comparative tests at Lincoln it produced forage yields equal to those of Nordan. No evaluation made as to its value as pasture. Sod production indicates its possible utilization for turf purposes.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

#### **S-5565**

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

*Source.*—Collection of fairway wheatgrass.

*Method of Breeding.*—Several generations of mass selection for tall, vigorous plants followed

by polycross progeny testing at three Saskatchewan stations. Synthetic of 16 clones formed.

*Description.*—Hay and seed yields 5–10 percent above fairway. Plants 2–3 inches taller, less strongly tillered, and less subject to lodging than fairway wheatgrass.

*Released.*—No. Included in regional tests. Breeder and prospective foundation fields established.

*Breeder Seed.*—Canada Agriculture Research Station, Saskatoon.

### TURKISH

Increased at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., and Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan and W. R. Kneebone.

*Source.*—Four source selections (P.I. 172690,

172691, 172694, and 180794) collected in Turkey by J. R. Harlan in 1948.

*Method of Breeding.*—Seed collected from planting made in 1950 at Woodward, seeded in separate rows at El Reno, Okla., in fall of 1952. Although rows kept separate, considerable number of volunteer plants appear each year and original identity of several strains probably lost. Seed from these four sources bulked for further increase.

*Description.*—Generally very leafy and looked good under irrigation. Dryland seedings to date disappointing in Oklahoma; strain may not be adapted so far south.

*Released.*—No. Included in regional testing program as Turkish fairway wheatgrass, and tested under name "Cresturk."

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

### *Agropyron dasystachyum* (Hook.) Scribn., thickspike wheatgrass

Cool-season, sod-forming native grass. Although widely distributed from Michigan westward to Nevada, more prevalent in Pacific Northwest. Provides early-spring grazing on native range. Grows well on light-textured soils; found on dry hillsides and exposed ridges up to elevation of about 10,000 feet.

#### P-1822

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Native vegetation east of The Dalles, Oreg.

*Method of Breeding.*—Selected by elimination of aberrant plants during several generations. Bulk selections increased under isolation.

*Description.*—Vigorous, blue, leafy, rapid spreading, and productive. Foliage and culms glaucous, with only partial pubescence on lemmas. Seed production fair to good, produces some sterile florets. Strain shows some resistance to leaf and stem rust. Well adapted to conservation use on light-textured soils in wind-erosion areas. (2n=28.)

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

#### P-14943

Selected at Plant Materials Center, SCS, Aberdeen, Idaho—D. S. Douglas and H. L. Harris.

*Source.*—Native collections.

*Method of Breeding.*—Six top-performing plants selected, isolated in crossing block, and seed bulked for breeder seed.

*Description.*—Tall, erect, medium-coarse stems; leaves abundant, long, flat, lax, and pale green; leaves and stems glaucous. Seeds show some pubescence. Good spring and fall recovery; seedling vigor good, but not equal to intermediate or pubescent wheatgrass. Susceptible to rust. Seed production and seed quality good. Forage yields on Chestnut soils at Tetonia, Idaho, equaled those of intermediate wheatgrass.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—Plant Materials Center, SCS, Aberdeen.

### *Agropyron desertorum* (Fisch.) Schult., crested wheatgrass (also standard crested wheatgrass)

Major cool-season bunchgrass indigenous to eastern Russia, western Siberia, and central Asia. First successful introduction received from Russian Turkestan in 1906. Used for pasture, hay, and erosion control primarily in northern Great Plains; important for range seeding westward to Cascade and Sierra Nevada mountains, and south

to northern Arizona and New Mexico. Long lived, drought resistant; tolerates heavy grazing, but not prolonged flooding. Valuable for reseeding in areas with 9- to 15-inch rainfall. Starts growth in early spring and ready to graze before native grasses.

**MANDAN 2194B**

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Two-clone synthetic. One clone selected from old nursery at Dickinson, N. Dak., other clone early large-seeded selection made by J. T. Sarvis.

*Method of Breeding.*—Each clone selected on basis of polycross progeny performance.

*Description.*—Uniform, tall, erect plants; compact heads with large awnless seed. High seed producer.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

**MANDAN 2359**

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Synthetic of three early clones selected by J. T. Sarvis.

*Method of Breeding.*—Parental clones selected on basis of polycross progeny tests.

*Description.*—Uniform, tall, erect plants; compact heads with large awnless seed. Good seed producer.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

**NEBRASKA 10**

Increased at Nebraska Agricultural Experiment Station, Lincoln, SCS and ARS cooperating—E. C. Conard.

*Source.*—Accession obtained by SCS from unknown commercial source and assigned number Nebraska 1007.

*Method of Breeding.*—Repeated plantings of Nebraska 1007 proved this lot to have superior seedling vigor and stand establishment as compared with those of other seed lots. Seed later increased by SCS nurseries and Nebraska Agricultural Experiment Station as Nebraska 10.

*Description.*—Vigorous, productive, early-maturing strain of crested wheatgrass, exhibiting various spike types predominantly of standard type. In comparative tests of forage yield, strain widely adapted and compared favorably in yield with leading standard strains. Believed to be of considerable potential value for selection because of its diverse plant types.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

**NORDAN (Reg. No. 2)**

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Developed from selection made in old nursery at Dickinson, N. Dak., in 1937.

*Method of Breeding.*—Single-plant selections made under open pollination for two generations; seven plants within open-pollinated progeny bulked for increase and tested as Mandan 571.

*Description.*—More uniform and erect than commercial, seed more awnless and larger in size, heads more dense and compressed. Good seedling vigor and seed quality. Forage yield as good as or better than commercial.

*Released.*—1953, cooperatively by North Dakota Agricultural Experiment Station, Fargo, and Crops Research Division, ARS.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

*Certified Seed.*—Available in quantity.

**SOUTH DAKOTA 15**

Selected at South Dakota Agricultural Experiment Station, Brookings—James G. Ross.

*Source.*—Original selections from adapted materials collected from old fields in South Dakota.

*Method of Breeding.*—Sibbing within outstanding open-pollinated progeny carried out. From these progenies, individuals selected on basis of greenhouse root rot tests. From polycross progeny tests, selections on basis of forage and seed-production evaluations made. This strain produced from synthetic of three of these selected genotypes.

*Description.*—Upright and very leafy. Awnless spikelets with longer rachis internodes than common *Agropyron desertorum*.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—South Dakota Agricultural Experiment Station.

**SUMMIT**

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

*Source.*—Introduction from Western Siberian Experiment Station, Omsk, U.S.S.R.; received in 1957.

*Description.*—Fairly similar to standard crested wheatgrass strains grown in United States. No attempt made to alter strain through selection, but one generation of increase was by single plants to rogue out impurities, particularly fairway-type plants. Tested as S-131.

*Released.*—Canada Department of Agriculture.



*Breeder Seed.*—Canada Agriculture Research Station, Saskatoon.

*Certified Seed.*—Available in quantity.

#### SUMMIT 62

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

*Source.*—Summit crested wheatgrass.

*Method of Breeding.*—Mass selection of 40 plants on basis of good seed yield, seed quality, and uniformity of plant type.

*Description.*—Improved uniformity and superior performance as compared with Summit.

*Released.*—1962, by Canada Department of Agriculture.

*Breeder Seed.*—Canada Agriculture Research Station, Saskatoon.

*Certified Seed.*—Available.

#### UTAH 42-1

Selected at Utah Agricultural Experiment Station, Logan, ARS cooperating—W. Keller.

*Source and Method of Breeding.*—Strain originated from 30 plants selected in 1948 from old field in hills between Cache and Box Elder Counties in northern Utah. These plants were tall, leafy, and dark green. After their transfer to Forage Experiment Farm, Logan, 9 plants discarded and remaining 21 cloned into 20 pieces and allowed to interpollinate to produce breeder seed of this strain.

*Description.*—Tall, erect, with considerable variation in respect to spike characteristics. Good forage yield, but relatively low seed yield.

*Released.*—No. Included in regional testing program. Original clones discarded and no longer maintained.

#### *Agropyron elongatum* (Host) Beauv., tall wheatgrass

Cool-season bunchgrass from Turkey and U.S.S.R. Used for hay and pasture in northern Great Plains and intermountain region. Tall, coarse, late-maturing species. Can be grown successfully on wet, alkaline soils. Less drought resistant than crested wheatgrass. Good seed producer. Produces high yields, but less palatable than most wheatgrasses.

#### A-12465

Selected at former SCS Nursery, Albuquerque, N. Mex. Increased for field testing at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Received from Beltsville, Md., as BN-3654 and P.I. 150123. Native to Eurasia, but introduced from Australia.

*Method of Breeding.*—Mass increase of seed collected from isolated block of spaced plants after roguing atypical plants.

*Description.*—Uniform, leafy, medium-tall bunchgrass; not as coarse as other tall wheatgrasses tested; true green type. Seed production not as high as some other strains tested, but forage production equal to most; limited observations indicate higher palatability. Earlier maturing than other strains tested.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

#### ALKAR

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Selection from P.I. 98526; introduced from U.S.S.R. in 1932.

*Method of Breeding.*—Mass selection from spaced plants of above introduction. Tested as P-2326.

*Description.*—Tall, very late maturing wheatgrass; stemmy bunch type. Coarse blue-green leaves. Large seeded, good seedling vigor. Very tolerant to wet, alkaline conditions and semiarid regions of West at 4,500- to 6,000-foot elevation. Fairly palatable and highly productive on subirrigated and irrigated saline and alkaline land.

*Released.*—1951, under accession P-2326 for certified seed production in Idaho, Washington, and Oregon. Named Alkar in 1958 and accepted for certification in these States and California.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

#### LARGO

Increased at former SCS Nursery, Albuquerque, N. Mex., as A1876, and at Utah Agricultural Experiment Station, Logan, ARS cooperating, as P.I. 109452.

*Source.*—P.I. 109452. Collected by Westover-Enlow expedition near Bandirma, Turkey. Introduced as *Agropyron intermedium* and later identified as *A. elongatum*.

*Method of Breeding.*—Bulk increase under isolation.

*Description.*—Large, coarse, deep-rooted bunchgrass. Population only slightly variable, with high percentage of bluish-green plants, maturing late at height of 4 to 6 feet. Widely used in Colorado, Utah, Arizona, and New Mexico for soil improvement and pasture on saline and alkaline soils. Highly productive in herbage and seed yields.

*Released.*—1937, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Nursery Division, SCS. First released as A-1876; later named Largo. Included in regional testing program as Utah 109452.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas, N. Mex.

*Certified Seed.*—Available in limited quantity. (Considerable quantity of this variety sold as tall wheatgrass only.)

#### NEBRASKA 98526

Increased at SCS nurseries in cooperation with Nebraska Agricultural Experiment Station, Lincoln. Tested as Nebraska 1978.

*Source.*—P.I. 98526 originally grown at Colorado Agricultural Experiment Station, Fort Collins, and later distributed to nurseries in Dakotas and Nebraska (1936) by SCS. P.I. 98526

originally introduced into United States from U.S.S.R. in 1932. Seed presented by N. I. Vavilov.

*Method of Breeding.*—Direct increase of P.I. 98526 without selection.

*Description.*—Erect, tall, somewhat coarse bunchgrass. Deeply veined, bluish-green leaves and coarse stems. Particularly well adapted to low, wet, or alkaline soil conditions, where it produces good yields. Also does very well in dry, upland plantings, where it appears moderately drought resistant. P.I. 98526 relatively leafy type, somewhat less aggressive and coarse than Turkish introductions with which it has been compared.

*Released.*—First grown on Nebraska farms for seed production under field certification by Nebraska Crop Improvement Association on recommendation of Nebraska Agricultural Experiment Station, SCS, and ARS.

*Certified Seed.*—Available.

#### *Agropyron inerme* (Scribn. and Smith) Rydb., beardless wheatgrass

Similar to *Agropyron spicatum* in appearance except for absence or near absence of awns. Distributed over much the same area, but less abundant than *A. spicatum*.

#### WHITMAR (Reg. No. 4)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Collected from native Palouse prairie grassland climax near Colton, Whitman County, Wash., by L. A. Mullen in area of 20 inches of annual precipitation at elevation of 2,800 feet on Palouse silt-loam soil.

*Method of Breeding.*—First observed as outstanding accession, P-3537, in observational tests among more than 500 beardless and bluebunch wheatgrass collections, which represented six eco-

types, from Pacific Northwest. Developed by selection from space-planted nursery.

*Description.*—Long-lived, native, perennial bunchgrass; drought resistant. Intermediate type, with moderately abundant, erect to semierect, medium-coarse stems. Leaves abundant, soft, lax, flat basal, and cauline. Seeds awnless, but short-awned seeds occur occasionally. Seedling vigor good. Seed and forage production high. Good spring and fall recovery and retains feed value and palatability late into summer. ( $2n=14$ .)

*Released.*—1946, by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

#### *Agropyron intermedium* (Host) Beauv., intermediate wheatgrass

#### A-12496

Important cool-season, sod-forming grass from U.S.S.R. Used for pasture and hay in northern Great Plains, west to eastern Washington, and south into Colorado and northern Kansas. Adapted in areas with annual rainfall of 15 inches or more; at some locations has grown well at elevations up to 10,000 feet. Slightly inferior to *Agropyron desertorum* in persistence, drought tolerance, and winter hardiness. Produces good hay yields, grows well with alfalfa, and suitable for erosion control.

Increased at former SCS Nursery, Albuquerque, N. Mex.—C. G. Marshall and J. A. Downs; and at Utah Agricultural Experiment Station, Logan, ARS cooperating—W. Keller.

*Source.*—P.I. 98568, Maikop, U.S.S.R.—increased at Utah Agricultural Experiment Station.

*Description.*—Variable, but not so mixed as many introductions. Good vigor and development at Albuquerque and Logan. Produced in quantity at former SCS Nursery, Albuquerque.

*Released.*—No. Seed distributed to SCS co-operators. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### AMUR

Selected at former SCS Nursery, Albuquerque, N. Mex.—J. A. Downs and T. F. Spaller.

*Source.*—P.I. 131532, Manchuria, China. Received as *Agropyron amurense* Drob. from SCS Nursery, Pullman, Wash., P-9838. Identified by J. R. Swallen as *A. intermedium*. Tested as A-13046.

*Method of Breeding.*—Increase, under isolation, of seed from spaced plants after roguing awned and other offtype plants. In 1962 at Plant Materials Center, SCS, Los Lunas, N. Mex., third-generation seed was space planted and rogued to maintain uniformity.

*Description.*—Leafy, vigorous-growing, but slow sod-forming type; uniform gray green. Strong seedling vigor. High seed yield; maintains production in successive years better than other strains tested.

*Released.*—1952, cooperatively by New Mexico Agricultural Experiment Station, University Park, and former SCS Nursery, Albuquerque.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Available.

### CHIEF

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

*Source.*—U.S.S.R. introduction and Ree variety.

*Method of Breeding.*—Mass selection for plants with high seed yields and good seed quality. Open-pollinated seed of selected plants bulked for each of 5 years to form five lines. Following performance tests, five lines combined in isolation to produce breeder seed. Breeder seed increased through foundation to produce certified seed. Provision made in licensing to replace five basic lines with improved lines selected from same basic material.

*Description.*—Grayish-green type. Forage yields 5-10 percent; seed yields 20-30 percent above Ree variety.

*Released.*—1961, by Canada Department of Agriculture.

*Breeder Seed.*—Canada Agriculture Research Station, Saskatoon.

*Certified Seed.*—Available in 1964.

### GREENAR (Reg. No. 3)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Developed from selection made in 1937 from P.I. 98568, which was introduced by

Westover-Enlow expedition from U.S.S.R. in 1932.

*Method of Breeding.*—Open-pollinated selections made from planting one generation after introduction. Aberrant plants removed in following generation. Selections bulked and increased for field testing as P-2327.

*Description.*—Vigorous, mild sod-forming wheatgrass; late maturing, leafy, dark green, broad leaved, high producing. Plants variable, but over 90 percent green. Less than 5 percent of plants show trace of pubescence. Spring recovery early and abundant; fall recovery good. Plants disease resistant, very productive, and aggressive. Widely adapted for conservation plantings on well-drained soils in dryland and irrigated areas.

*Released.*—1945, as P-2327, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman. Named Greenar in 1956.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

### IDAHO 3

Selected at Idaho Agricultural Experiment Station, Moscow—C. L. Canode.

*Source.*—Selections from Greenar (P-2327).

*Description.*—Seven-clone synthetic comprised of plants that are predominately green. Plants selected for less vigor of rhizome spread, increased seed yield, awnlessness, and freedom from pubescence on lemmas.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### IDAHO 4

Selected at Idaho Agricultural Experiment Station, Moscow—C. L. Canode.

*Source.*—Selections from Greenar (P-2327).

*Description.*—Nine-clone synthetic. Plants selected for color, leafiness, mild sod-forming characteristic, and increased seed yield. Lemmas mostly free of pubescence and practically awnless.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### IOWA M2-10820

Selected at SCS Nursery, Ames, Iowa—M. E. Heath and A. I. Alcott.

*Source.*—Original seed from SCS Nursery, Lincoln, Nebr., (Nebraska-2961) in 1941 and traces back to introduction P.I. 98568.

*Method of Breeding.*—Seed saved from several glaucous bluish-green plants in 1943, planted, and first increase harvested in 1945. Subsequently several additional generations of seed increase made by SCS Nurseries at Ames and Ankeny, Iowa, until 1953.

*Description.*—Consists mostly of glaucous bluish-green plants. Slightly earlier but otherwise similar in most respects to Nebraska 50, Ree, and other strains originating from P.I. 98568. Apparently has no distinctly superior forage or seed traits to recommend it.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### MANDAN 1274

Increased at U.S. Northern Great Plains Field Station, ARS, and SCS Nursery, Mandan, N. Dak.

*Source.*—Seed harvested by Wayne Austin in 1937 from planting of P.I. 98568 at Fort Collins, Colo.

*Method of Breeding.*—No breeding background; traces to same parental material as Ree.

*Description.*—Types intergrading into pubescent wheatgrass; green and blue-green plants; highly variable.

*Released.*—No official release, but grown throughout northern Great Plains.

*Breeder Seed.*—None.

*Certified Seed.*—Available in quantity.

### NEBRASKA 50

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

*Source.*—Selection from increase of P.I. 98568, originally grown at Colorado Agricultural Experiment Station, Fort Collins, and later distributed to nurseries in Dakotas and Nebraska. Original introduction from Maikop, U.S.S.R., in 1932.

*Method of Breeding.*—Selection of Nebraska 50 carried through three generations, 1941-46, directed toward glaucous blue-green type, with elimination of light-green plants and plants with pubescent lemmas. Seed of selected progenies with desired characteristics bulked in third generation.

*Description.*—Nebraska 50 maintains excellent seed quality and seedling vigor of common intermediate wheatgrass derived from P.I. 98568, combined with greater uniformity of glaucous blue-green plant type. This type appears better adapted in tests in southern range of adaptation of grass than do light-green selections. Forage and seed yields of Nebraska 50 compare favorably in most tests with those of other strains.

*Released.*—1950, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### OAHE (Reg. No. 5)

Selected at South Dakota Agricultural Experiment Station, Brookings—James G. Ross.

*Source.*—Oahe (Oh-wah-hee) selected from Russian introduction P.I. 98568 obtained from Fort Collins, Colo., in 1937 and released by South Dakota Agricultural Experiment Station in 1945 as Ree. Introduction identified as derivative of cross between *Agropyron intermedium* and *A. trichophorum*. Named after Oahe Dam on Missouri River in central South Dakota. Oahe is abbreviation of Sioux word for "Big House," a meeting place once located near dam.

*Method of Breeding.*—High seed-producing plants selected from nursery of self- and open-pollinated progenies by analysis of percent seed set of individual plants. After two succeeding generations of polycross testing and selection for high seed set, forage yield, and rust resistance, four clones chosen to make this synthetic variety. Distributed for testing as South Dakota 20.

*Description.*—Uniformly blue green, vigorous, rhizomatous; abundant leaves; plants approximately 44 inches high under normal conditions at Brookings. Produces good yields of seed and forage. Breeder seed obtained from selected clones; variety maintained on basis of two seed generations: Foundation seed from fields established with breeder seed and certified from fields established from foundation seed. Certified seed will be used for hay and pasture, but seed from such fields cannot be certified.

*Released.*—1961, by South Dakota Agricultural Experiment Station.

*Breeder Seed.*—South Dakota Agricultural Experiment Station.

*Certified Seed.*—Available.

### REE

Increased at South Dakota Agricultural Experiment Station, Brookings—C. J. Franzke.

*Source.*—Introduced as *Agropyron pungens* (Pers.) Roem. and Schult. by former Bureau of Plant Industry, USDA, from Leningrad, U.S.S.R., in April 1932. Originated in Maikop region of U.S.S.R. at elevation of 600 feet. Originally this introduction, P.I. 98568, distributed by USDA to Dickinson and Mandan, N. Dak., in 1932; and to Fort Collins, Colo., Pullman, Wash., Cheyenne, Wyo., and Bozeman, Mont., in 1935. Seed harvested from Fort Collins planting brought to South Dakota Agricultural Experiment Station

in fall of 1937 by Wayne Austin of SCS as *A. pungens*. Planted in early fall of 1937 in observational plot at South Dakota Agricultural Experiment Station with several other known *Agropyron* species. Discovered that this strain exhibited certain outstanding plant differences from known strains of *A. pungens* and *A. intermedium*. Material of strain collected in July 1941 classified by J. R. Swallen as derived from cross of *A. intermedium* and *A. trichophorum* (Link) Richt.

*Method of Breeding*.—Strain released without selection from original material grown at South Dakota Agricultural Experiment Station.

*Description*.—Plants vary from light green to dark green; many covered with whitish bloom; erect, 30–48 inches tall. Stems, as compared with those of smooth brome, medium fine to large,

coarse, and leafy. Produce abundant basal leaves; leaf blades longer and broader than leaves of smooth brome. Seed head or spike erect to slightly nodding, lax, 6–14 inches long. Lemmas of some plants have pronounced awns; those of others are awnless or practically so. Sometimes pubescent. Seedlings have characteristic reddish anthocyanin color, which disappears when they become 3 or 4 weeks old. Strong and large, resembling newly emerged winter rye seedlings. Yields of this grass in South Dakota better than or equal to those of best strains of smooth brome.

*Released*.—1945, by South Dakota Agricultural Experiment Station.

*Breeder Seed*.—South Dakota Agricultural Experiment Station.

*Certified Seed*.—Not available.

### ***Agropyron repens* (L.) Beauv., quackgrass**

Cool-season, sod-forming, introduced grass, probably from Europe. Common, persistent weed in cultivated and abandoned fields in Northern

United States. Existing stands used for hay, pasture, and silage. Varieties not available.

### ***Agropyron riparium* Scribn. and Smith, streambank wheatgrass**

Cool-season, sod-forming grass. Found from Montana to Washington and south into Nevada, Utah, and Colorado. Adapted for erosion control and general-purpose turf. Drought resistant and alkali tolerant.

#### **SODAR**

Selected at Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman, Wash.—R. H. Stark and J. L. Schwendiman.

*Source*.—Collected near Canyon City, Grant County, Oreg., by R. G. Johnson in area of 12-inch annual rainfall at elevation of 3,000 feet.

*Method of Breeding*.—Best of 11 accessions. Improved by mass selection and elimination of

aberrants during several generations at Plant Materials Center, SCS, Aberdeen. Tested as P-2415.

*Description*.—Drought-resistant, rhizomatous grass, particularly adapted for erosion control. Excellent seedling vigor. Narrow, tough leaves. Produces open sod highly competitive to weeds and other plants under dryland conditions and offers excellent protection against soil erosion. Used primarily on roadsides, airports, and irrigation canal banks.

*Released*.—1954, cooperatively by Idaho and Washington Agricultural Experiment Stations at Moscow and Pullman, respectively, and Plant Materials Centers, SCS, Aberdeen and Pullman.

*Breeder Seed*.—Plant Materials Center, SCS, Aberdeen.

*Certified Seed*.—Available.

### ***Agropyron sibiricum* (Willd.) Beauv., Siberian wheatgrass**

Cool-season bunchgrass from U.S.S.R. Similar to *Agropyron desertorum* in appearance and distribution, but less widely tested and used.

#### **A-10675**

Increased for field testing at former SCS Nursery, Albuquerque, N. Mex.

*Source*.—P.I. 108434. Kasakstan, U.S.S.R. Westover-Enlow expedition. Obtained from SCS Nursery, Pullman, Wash., in 1940–41 as P-27.

*Method of Breeding*.—Bulk increase of material received. Maintained through successive generations in isolated block plantings.

*Description*.—Not entirely uniform, but typical population is fine stemmed, leafy well up culms; has long, slender heads, some with awns. Matures seed about 2 weeks later and produces higher yields of forage and seed than crested wheatgrasses tested.

*Released*.—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas, N. Mex.

**P-27**

Selected at Plant Materials Centers, SCS, Pullman, Wash., and Aberdeen, Idaho—J. L. Schwendiman and R. H. Stark.

*Source.*—Original collection in 1934 from Kasakstan, U.S.S.R.; obtained from Institute of Plant Industry, Leningrad, U.S.S.R., by West-over-Enlow expedition. P.I. 108434.

*Method of Breeding.*—Included in row nurseries and field-evaluation studies since 1935. Indi-

vidual clones selected in 1949 by R. H. Stark are basis of present increase.

*Description.*—Similar to standard crested wheatgrass, *Agropyron desertorum*, in adaptation and season of use, but differs in several important respects. Narrow, awnless heads; fine, leafy stems. Drought resistant, good seedling vigor, good seed yields. Well adapted to light, droughty soils.

*Released.*—1953, cooperatively by Idaho Agricultural Experiment Station, Moscow, and Plant Materials Centers, SCS, Aberdeen and Pullman.

*Breeder Seed.*—Plant Materials Center, SCS, Aberdeen.

*Certified Seed.*—Available in quantity.

***Agropyron smithii* Rydb., western wheatgrass**

Important cool-season, sod-forming grass. Widely distributed from Wisconsin to central Washington and south into New Mexico and Texas Panhandle. Major range grass in northern and central Great Plains, where used for early pasture, hay, and erosion control. Develops slowly from seed, is drought resistant, and has moderate alkali tolerance.

**MANDAN 456**

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Field collection made at Mandan in 1939.

*Method of Breeding.*—Bulked seed of 13 clones originating within progeny of single selection from above source. Thirteen clones selected for density of growth, leafiness, softness of leaves, and rust resistance.

*Description.*—Vigorous, leafy, rust resistant.

*Released.*—No. Increased in 1941.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

*Certified Seed.*—Not available. (Some commercial supplies.)

**P-14897**

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—O. K. Hogle and H. W. Miller.

*Source.*—Original seed apparently obtained in 1935 from L. A. Pritchard, Crook National Forest Nursery, Superior, Ariz.; believed to have been from a commercial lot, source unknown. This lot directly traceable only to field collection made in 1956 by C. U. Finch and O. K. Hogle from only perennial in abandoned nursery near Montague, Calif. Believed to be progeny of *Agropyron*

*smithii*, accession number A-1922, planted there in 1941.

*Method of Breeding.*—Natural selection in continental climatic area. Increased under isolation at Plant Materials Center, SCS, Pleasanton.

*Description.*—Vigorous, rhizomatous, glaucous, with strong seedling vigor. Tends to lodge when mature. Attacked by leaf rust in wet years at Pleasanton, but not in continental climate. Excellent seed and forage producer.

*Released.*—No. Included in field-evaluation plantings in California and elsewhere in Western States.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

**PM-C-30**

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collected in 1957 near Flagler, Colo., from High Plains site at elevation of 5,000 feet and annual precipitation of about 16 inches.

*Method of Breeding.*—Bulk increase from initial planting. Increased through five successive generations to improve seed-production potential.

*Description.*—Rapid germination and good seedling establishment. Dense; dark-green, medium-height foliage; aggressive rhizomes. Superior to other accessions tested in seed production. Production block at Los Lunas yielded 258 pounds of seed per acre in 1963.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

**PM-M-23**

Increased at Plant Materials Center, SCS, Bridger, Mont.—J. L. McWilliams and A. A. Thornburg.

*Source.*—Harvest from native meadows along Porcupine Creek northwest of Forsyth, Rosebud County, Mont., 1959.

*Method of Breeding.*—Direct increase of field collection and comparisons with approximately 60 other accessions representing native collections from Montana and Wyoming.

*Description.*—Good seedling vigor, strong rhizomes, good forage and seed producer. Yields of 140–293 pounds of clean seed per acre with irrigation at Bridger.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Bridger.

### **Agropyron spicatum (Pursh) Scribn. and Smith, bluebunch wheatgrass**

Important cool-season bunchgrass in intermountain region from western Montana to central Washington and south into Nevada and Utah. Valuable species in native range where prized for palatability and drought resistance. Seeds have awns and must be processed for satisfactory seeding.

#### **P-739**

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Collected in 1934 on Mallery Ridge at elevation of 3,175–4,792 feet, Umatilla National Forest, Asotin County, Wash.

*Method of Breeding.*—First observed as promising accession in Pullman nursery, which contained more than 500 Pacific Northwest beardless and bluebunch wheatgrass collections, representing six ecotypes. Developed by mass selection from spaced plantings.

*Description.*—Long-lived, native perennial; drought resistant. Spreads slowly from short rhizomes. Leaves abundant, erect to semierect, soft, lax, flat, and primarily basal. Stems moderately abundant, erect to semierect, and medium coarse. Seeds large, heavy, and awned; must be processed to permit satisfactory seeding. Best adapted at higher elevations where available moisture exceeds 8 inches; good spring and fall recovery. Retains feed value and palatability late into summer and fall. ( $2n=28$ .)

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Plant Materials Center, SCS, Aberdeen, Idaho.

#### **PM-C-29**

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collected by J. A. Downs in 1957 near Kremmling, Colo., from unfavorable site, but typical of large acreages needing vegetative improvement in western Colorado.

*Method of Breeding.*—Seed collected from selected plants in initial increase block, bulked, and planted in isolation, where plants were spaced and rogued heavily at intervals during first year of seeding. Seed collected second year and planted for bulk increase.

*Description.*—Selection not as productive in seed and herbage as some accessions collected from less depleted sites. Hardy and drought resistant. Might fill need in reestablishment of permanent vegetation on certain arid, high-elevation sites.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

#### **PM-M-161**

Increased at Plant Materials Center, SCS, Bridger, Mont.—J. L. McWilliams and A. A. Thornburg.

*Source.*—Commercial collection from native stand along American Fork River south of Harlowton, Wheatland County, Mont., 1960.

*Method of Breeding.*—Direct increase of field collection and comparisons with approximately 70 other accessions from Montana and Wyoming.

*Description.*—Good seedling vigor and seed production. Yields of 147–324 pounds of clean seed per acre with irrigation at Bridger.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Bridger.

### **Agropyron trachycaulum (Link) Malte, slender wheatgrass**

Important cool-season bunchgrass in northern Great Plains, west to eastern Washington and Oregon, and south into Nevada, Utah, and Colorado. First native grass widely used for reseeding

in western Canada and United States. Good seedling development, alkali tolerant, relatively short lived, and less drought resistant than western and crested wheatgrass. Seldom found in pure stands.

**PRIMAR (Reg. No. 1)**

Selected at Plant Materials Center, SCS, Pullman, Wash.—A. L. Hafenrichter, J. L. Schwendiman, and A. G. Law.

*Source*.—Collected near Beebe, Mont., in 1933 by Forest Service, USDA.

*Method of Breeding*.—Selected from original collection, assigned accession number P-2535, and tested with 104 other accessions.

*Description*.—Vigorous, early-growing wheatgrass; semierect, long lived, slender. Usually 10 days earlier in seed maturity and 5–10 inches taller than late commercial strains. Leaves and stems moderately coarse and glaucous gray green. Plants high in vegetative production. Resistant to leaf rust, stem rust, and stripe rust; superior to

common slender wheatgrass in resistance to head smut. Seed production moderately heavy; seeds relatively large when compared with those of ordinary strains. Adapted for use in sweet-clover-grass conservation mixtures for pasture, hay, and green manure. Alkali tolerant. Adapted to short-lived dryland seedings in areas with minimum of 14 inches of rainfall.

*Released*.—1946, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively; Plant Materials Center, SCS, Pullman; and Crops Research Division, ARS.

*Breeder Seed*.—Plant Materials Center, SCS, Pullman.

*Certified Seed*.—Available in quantity.

**Agropyron trachycaulum X Hordeum jubatum L.****X AGROHORDEUM**

Selected at Utah Agricultural Experiment Station, Logan—W. S. Boyle.

*Source*.—Hybrid between *Agropyron trachycaulum* and *Hordeum jubatum*.

*Method of Breeding*.—Colchicine-induced allopolyploid from sterile, tetraploid hybrid between

*A. trachycaulum* and *H. jubatum*. Selected for increased fertility.

*Description*.—Tall, reasonably fertile hybrid. Information lacking on adaptation.

*Released*.—No. Included in regional testing program.

*Breeder Seed*.—Utah Agricultural Experiment Station.

**Agropyron trichophorum (Link) Richt., pubescent wheatgrass**

Cool-season, sod-forming grass from U.S.S.R. Distinguished from *Agropyron intermedium* by presence of short, stiff hairs on heads and seeds, but otherwise similar in appearance and use. Plant types intergrade from one species to another. Some evidence that pubescent may be more drought tolerant than intermediate wheatgrass.

**A-1488**

Increased at former SCS Nursery, Albuquerque, N. Mex.

*Source*.—P.I. 107328 introduced from Tashkent, Turkestan, U.S.S.R., by Westover-Enlow expedition in 1934.

*Method of Breeding*.—Bulk increase of source material.

*Description*.—Not as tall and robust as many strains, but aggressively rhizomatous. Tends to decline in seed production in successive years under irrigation. Used in range reseeding tests in Utah, Colorado, and northern New Mexico. In many plantings exhibited persistence and ability to withstand grazing abuse, forming dense sod and affording soil protection. From such a plot, clones were selected in 1959 from plants showing superior spreading ability and lacking coarseness.

Clones planted at Los Lunas, N. Mex., progeny tested, and seed produced for field testing on problem sites. Reselected source designated as A-1488 MC.

*Released*.—No. Included in regional testing program.

*Breeder Seed*.—Plant Materials Center, SCS, Los Lunas. A-1488 will probably be discontinued, and A-1488 MC maintained for testing.

*Certified Seed*.—Not available. (Most common pubescent wheatgrass commercially available in Utah and Colorado originated from this number.)

**LUNA**

Selected at former SCS Nursery, Albuquerque, N. Mex., and increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source*.—Collected by Westover-Enlow expedition to U.S.S.R. and Turkey in 1934. Introduced as *Agropyron popovii*, P.I. 106831, and identified as A-1115 at Albuquerque.

*Method of Breeding*.—Original accession space planted and rogued heavily through two generations for *A. trichophorum* type.



*Description.*—Some seed heads appear glabrous and hence are similar to *A. intermedium*; however, all basal leaf blades are hairy. Excellent seedling vigor, fast establishment, and high production of herbage. Leaves wide, lax, and dark green.

*Released.*—1963, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Not available.

#### MANDAN 759

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Increase of P.I. 116252 from U.S.S.R. in 1936. Seed presented by N. I. Vavilov.

*Method of Breeding.*—Progeny tests of original introduction.

*Description.*—Higher forage and seed yields and greater persistence than other varieties of pubescent wheatgrass in tests at Mandan. Rapid spreader under favorable conditions. Some plants intergrade taxonomically into *Agropyron intermedium*, but variety as whole forms more open sod than intermediate wheatgrass.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

#### TOPAR

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman and Donald S. Douglas.

*Source.*—P.I. 107330 introduced from Tashkent, Turkestan, U.S.S.R., by Westover-Enlow expedition in 1934.

*Method of Breeding.*—Developed by selection from spaced planting. Selections bulked and in-

creased under isolation. All testing prior to 1953 was as accession P-41.

*Description.*—Vigorous-growing, late-maturing wheatgrass; sod forming and drought resistant. Resembles and closely related to intermediate wheatgrass, but pubescent on leaves, stems, and lemmas. Forms sod more rapidly and adapted to lower fertility, higher elevations, and more alkaline sites than intermediate wheatgrass. Seedling vigor very good. Seed production moderate and seed does not shatter easily. Adapted to shallow soils and low fertility sites in 10- to 14-inch rainfall areas of West.

*Released.*—1953, cooperatively by Washington, Idaho, Oregon, and California Agricultural Experiment Stations at Pullman, Moscow, Corvallis, and Davis, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, Pleasanton, Calif., and Pullman.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

#### UTAH 109

Selected at Utah Agricultural Experiment Station, Logan, ARS cooperating—W. Keller.

*Source.*—Seed obtained from Intermountain Forest and Range Experiment Station and from old seed-increase nursery on Experimental Farm, Logan.

*Method of Breeding.*—Increased on basis of performance in 6-year test. Replicated-plot test included 47 strains of wheatgrass and brome grass.

*Description.*—Highly variable in many characters; blue-green pubescent, green pubescent, and blue-green glabrous plants.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### *Agrostis alba* L., redtop

Important cool-season, stoloniferous grass from Europe. Used as temporary grass in lawn seed mixtures, for pastures, erosion control, and occasionally hay. Found throughout cooler parts of

United States, especially in northeastern and north-central regions. Adapted for use on poorly drained acid soils. Less aggressive than colonial bentgrass. Varieties not available.

### *Agrostis canina* L., velvet bentgrass

Cool-season, stoloniferous grass introduced from Europe. Used on putting greens, bowling greens, and lawns in some coastal areas of Northeastern United States. Relatively shade tolerant, but does not thrive on poorly drained soils. Propagated from either seed or stolons.

#### KERNWOOD

Selected at Kernwood Country Club, Salem, Mass.

*Description.*—Becomes green very early in season and continues green well into winter in rather

mild climate of Rhode Island. Medium to dark green.

*Released.*—Not officially.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (No information on commercial sources.)

#### KINGSTOWN

Selected at Rhode Island Agricultural Experiment Station, Kingston—C. R. Skogley and J. A. DeFrance.

*Source.*—Inbred selection from Piper by H. F. A. North in 1929.

*Method of Breeding.*—Maintained vegetatively and from seed since initial selfing. Comparative testing.

*Description.*—Semibrilliant dark green; excellent vigor and density; good texture and density. Good resistance to most diseases; very resistant to dollar spot.

*Released.*—1963, by Rhode Island Agricultural Experiment Station.

*Breeder Seed.*—Rhode Island Agricultural Experiment Station. Smut infection eliminated at Oregon Agricultural Experiment Station, Corvallis, prior to varietal acceptance and release of breeder seed.

*Certified Seed.*—Limited quantity by 1964 or 1965.

#### RARITAN

Selected at New Jersey Agricultural Experiment Station, New Brunswick—Howard B. Sprague.

*Source.*—All commercial strains and named varieties available in 1930.

*Method of Breeding.*—Continuous selection in successive generations of what appeared to be outstanding individual plants. With each successive generation, outcrossing limited to families selected from previous generation. Relatively uniform and vigorous families combined to make synthetic variety.

*Description.*—Plants selected for seedling vigor, good seed yield, apparent freedom from disease, vigor of mature plants, and turf quality. Parallel testing of turf plots produced from seed of selected plants accompanied later stages of selection. Vigorous variety producing fine-quality turf. Displays excellent adaptation to climatic conditions prevailing in New Jersey.

*Released.*—1940, by New Jersey Agricultural Experiment Station.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available.

### *Agrostis palustris* Huds., creeping bentgrass

Cool-season, stoloniferous grass from Eurasia. Used for lawns, putting greens, and erosion control. Planted on putting greens throughout much of the United States, especially in Northeastern, Midwestern, and Northwestern States. Two types commercially available. One represents group of individual strains selected from established greens of South German mixed bentgrass; all these strains must be propagated vegetatively. Second type includes Penncross and Seaside strains grown from seed.

#### ARLINGTON

Selected at Arlington, Va., by U.S. Golf Association Green Section, ARS cooperating—John Monteith, Jr.

*Source.*—Collected in 1928 from practice green at Country Club of Atlantic City, Northfield, N.J.

*Method of Breeding.*—Increased vegetatively for testing as C-1.

*Description.*—Tough, sturdy, rather slow growing, bluish green. Responds to careful management. Requires high level of soil fertility, minimum irrigation, and close mowing to reduce swirl. Somewhat resistant to dollar spot and melting out (*Helminthosporium-Curvularia* complex) and susceptible to brown patch. Grows well in hot

weather. Not generally recommended for use in pure stands, but combines well with Congressional if not subjected to overwatering.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially.)

#### C-52

Selected in spring of 1934 at Old Orchard Grass Nursery, Madison, Wis.—R. R. Bond.

*Method of Breeding.*—Increased vegetatively as C-52.

*Description.*—Good color and texture. Some resistance to dollar spot. Some tendency to thin out during hot weather. Adapted to parts of Midwestern United States, where used rather widely.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially. Also sold under trademark "Old Orchard.")

#### COHANSEY

Selected by E. R. Steiniger in 1935.

*Source.*—Fourth green at Pine Valley Golf Club, Clementon, N.J.

*Method of Breeding.*—Increased vegetatively for testing as C-7.

*Description.*—Vigorous, aggressive, yellowish green. Tolerates frequent watering and exhibits wide adaptation to climatic conditions. Performed very satisfactorily in warm areas. Exhibited some tolerance to brown patch and melting out, but susceptible to dollar spot.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially.)

### COLLINS

Selected at Arlington, Va., by U.S. Golf Association Green Section, ARS cooperating—John Monteith, Jr.

*Source.*—Collected in 1937 from eighth green at Washington Golf and Country Club, Rosslyn, Va.

*Method of Breeding.*—Increased vegetatively for testing as C-27.

*Description.*—Dark green, rather nonaggressive. Somewhat comparable to Seaside in susceptibility to disease, except possibly better rating for brown patch tolerance.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially in limited quantity.)

### CONGRESSIONAL

Selected by R. P. Hines, Jr., in 1936.

*Source.*—Thirteenth green at Congressional Country Club, Rockville, Md.

*Method of Breeding.*—Increased vegetatively for testing as C-19.

*Description.*—Attractive dark green and good texture. Hardy variety; starts growth early in spring and retains color well into fall and winter. Susceptible to brown patch. Good variety either alone or in combination with Arlington (C-1) and/or Collins (C-27).

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially.)

### DAHLGREN

Selected at Beltsville, Md., by U.S. Golf Association Green Section, ARS cooperating—Fred V. Grau.

*Source.*—Collected in 1946 at Naval Proving Grounds, Dahlgren, Va.

*Method of Breeding.*—Increased vegetatively for testing as C-115.

*Description.*—Coarse, disease resistant, not suited for putting-green turf. May be satisfactory for heavily used tee areas and park-lawn turf receiving low level of maintenance.

*Released.*—No.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available.

### EVANSVILLE

Selected at Indiana Agricultural Experiment Station, Lafayette—W. H. Daniel.

*Source.*—Plant found in 1958 on No. 5 putting green, Evansville Country Club, Evansville, Ind.

*Method of Breeding.*—Vegetative increase of original accession. Rated best for putting greens in 3-year test.

*Description.*—Dark-green, fine-leaved, dense turf at all nitrogen levels tested. Resistant to dollar spot and tolerant to brown patch.

*Released.*—1963, by Indiana Agricultural Experiment Station.

*Breeder Stock.*—Indiana Agricultural Experiment Station.

*Certified Stock.*—Available.

### METROPOLITAN

Selected at Arlington Farms, Va., by U.S. Golf Association Green Section, ARS cooperating.

*Source.*—Material sent to USDA in 1917 for identification purposes by New York City seed firm.

*Method of Breeding.*—Increased vegetatively for testing as C-51.

*Description.*—Difficult to manage, turf tends to become fluffy and grainy. Very susceptible to melting out.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Practically no Metropolitan bentgrass available commercially.)

### NORBECK

Selected at Arlington, Va., by U.S. Golf Association Green Section, ARS cooperating—John Monteith, Jr.

*Source.*—Collected in 1937 from fourth green at Manor Club, Norbeck, Md.

*Method of Breeding.*—Increased vegetatively for testing as C-36.

*Released.*—Not officially. (Planting stock no longer available.)

### PENNCROSS (Reg. No. 1)

Selected at Pennsylvania Agricultural Experiment Station, University Park—H. B. Musser.

*Source.*—Parent strains for seed production identified under station accession numbers 10(37)4 (Pennlu creeping bentgrass), 9(38)5, and 11(38)4.

*Method of Breeding.*—First-generation seed produced by random crossing of three vegetatively propagated clones of creeping bentgrass.

*Description.*—Turf-quality records obtained over 5-year period at Pennsylvania Agricultural Experiment Station show Penncross significantly better in density, tolerance to disease, and rate of recovery from attacks than other commercially available seeded types. Because of general vigor, shows exceptional ability to produce better turf than other seeded bentgrasses under adverse conditions. Recommended for golf-course putting greens and similar intensive turfgrass areas.

*Released.*—1954, by Pennsylvania Agricultural Experiment Station.

*Breeder Stock.*—Parent clones maintained by Pennsylvania Agricultural Experiment Station.

*Certified Seed.*—Available.

### PENNLU (Reg. No. 2)

Selected at Pennsylvania Agricultural Experiment Station, University Park—H. B. Musser.

*Source.*—First observed at LuLu Temple Golf Course, Philadelphia, Pa., by Edward Roberts and Walter Groff. Sent to Pennsylvania Agricultural Experiment Station for evaluation by C. K. Hallowell. Tested under accession number 10(37)4.

*Description.*—Consistently good performance, chiefly owing to high disease tolerance, good vigor, density, texture, and ability to withstand wide temperature range. Recommended for use on golf-course greens and similar specialized turf.

*Released.*—1954, by Pennsylvania Agricultural Experiment Station.

*Breeder Stock.*—Pennsylvania Agricultural Experiment Station.

*Certified Stock.*—Available.

### SEASIDE

*Description.*—Established from seed. Quality poorer than that of most selected varieties of creeping bentgrass. Below average in disease resistance. Develops patches of individual strains

that exhibit almost endless variation in texture, color, graininess, and disease susceptibility.

*Released.*—Not officially.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity.

### TORONTO

*Source.*—Toronto Golf Club, Long Branch, Ontario, Canada.

*Method of Breeding.*—Increased vegetatively for testing as C-15.

*Description.*—Vigorous, aggressive, requires careful management. Dark green; fine texture. Susceptible to dollar spot and brown patch. Well adapted in eastern Canada and Midwestern United States.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially in limited quantity.)

### WASHINGTON

Selected at Arlington Farms, Va., by U.S. Golf Association Green Section, ARS cooperating.

*Source.*—Collected at Washington Golf and Country Club, Rosslyn, Va.

*Method of Breeding.*—Increased vegetatively for testing as C-50.

*Description.*—Washington and Metropolitan were first named strains of creeping bentgrass. Washington is heat resistant, exhibiting some tolerance to disease. Relatively short growing season; grows slowly in spring, growth stops in early fall, with cool weather assumes purple tinge. Light green; excellent texture.

*Released.*—Distributed in golf-turf industry.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially. Appears to be more than one strain being increased and used under name "Washington." Also known as Flossmoor bentgrass and Wakonda Washington.)

## **Agrostis tenuis Sibth., colonial bentgrass (also Rhode Island, browntop, New Zealand, Prince Edward Island)**

Important cool-season, stoloniferous grass from Europe. Used for golf courses, lawns, and erosion control. Well adapted in northeastern region and along northern Pacific coast. Inferior to creeping and velvet bentgrass for putting greens and other fine turf.

### ASTORIA

*Source.*—Collection made in northwestern Oregon by Engbretson and Hyslop in 1926.

*Method of Breeding.*—Comparative testing.

*Description.*—Weakly creeping; short stolons; semierect, slender culms. Short ligule, round to obtuse in shape, finely toothed, and often split. Panicle open with delicate form and somewhat larger than that of common colonial. In general, Astoria and common colonial cannot be readily distinguished on basis of growth habit or color. Astoria may be slightly more robust but not under all conditions. Susceptible to brown patch. Used in lawn mixtures and on fairways.

*Released.*—Yes. Included in seed certification program in Oregon in 1926.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity. Common colonial seed certified in Washington State. Most of production traces to seed collected originally from native stands found in southwest part of State, north of Columbia River to Olympia.

#### EXETER

Selected at Rhode Island Agricultural Experiment Station, Kingston—J. A. DeFrance and C. R. Skogley.

*Source.*—Collections made in Rhode Island, eastern Connecticut, and Massachusetts about 1940.

*Method of Breeding.*—Comparative testing.

*Description.*—Similar to Astoria. Becomes green earlier in spring; holds color better in summer. Bright green, more leafy than varieties. Very winter hardy. Some leaf spot resistance. Seems best adapted to north and east in cool-season turfgrass region. Used in lawn mixtures, fairways, lawn tennis courts, and bowling greens.

*Released.*—1963, by Rhode Island Agricultural Experiment Station.

*Breeder Seed.*—Rhode Island Agricultural Experiment Station.

*Certified Seed.*—Limited quantity in 1964.

#### HIGHLAND

*Source.*—Collections made in southern Willamette Valley, Oreg., in about 1930.

*Method of Breeding.*—Comparative testing.

*Description.*—Astoria and common colonial bentgrass very similar in appearance; Highland has several distinctive characteristics. Bluish green, with erect, robust culms. Ligule longest of three types, about 1–3.5 mm., round to obtuse in shape, finely toothed, and often split. Panicles generally largest of three, pyramidal in form, with variations from Astoria to almost appearance of

redtop. Culms tend to be coarser and taller. Culms and panicles dull, light red up to spikelets and remain so at ripening. Panicles semiclosed after blooming, making it readily noticeable in fields of common colonial, which turns brown at ripening and its panicles remain open. Highland stoloniferous, slightly stronger creeper than other types. Susceptible to brown patch. Turf tends to become puffy when mowed at ordinary lawn height. Used in lawn mixtures and on fairways.

*Released.*—Yes. Included in seed certification program in Oregon in 1934.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity.

#### HOLFIOR

Developed by D. J. van der Have, Kapelle-Biezeling, Netherlands.

*Source.*—Collection of plants from southern Holland.

*Method of Breeding.*—Initial selection for short stolons, dense plant growth, and fine leaves. Polycross progeny tested under short-mowed turf conditions. Six plants saved to produce synthetic variety based on uniform maintenance of growth throughout growing season.

*Description.*—Fine leaved, slightly darker green than Astoria. Under U.S. conditions does not spread rapidly, but produces dense turf with good texture. Growth more upright than other colonial bentgrasses and does not mat as severely. Produces excellent turf at height of one-half to 1 inch.

*Released.*—Holland, 1940, by D. J. van der Have; United States, 1963, by Northrup, King & Co.

*Breeder Seed.*—D. J. van der Have.

*Certified Seed.*—Available under Organization for Economic Cooperation and Development (OECD) scheme.

### *Alopecurus arundinaceus* Poir., creeping foxtail

Cool-season, sod-forming grass from Eurasia. Limited use for hay, pasture, and erosion control in moist areas of northern Great Plains, Pacific Northwest, and intermountain region. Possesses strong rhizomes, forms dense sod, and well adapted to wetland pastures and some mountain meadows.

#### GARRISON

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—Jesse L. McWilliams.

*Source.*—Field collection made near Max, McLean County, N. Dak., in 1950. Information obtained from local people there indicates grass brought into area from eastern Germany or west-

ern U.S.S.R. by immigrant in early days of homesteading. Escaped and growing around many pothole sloughs in area. In his Handbook of North Dakota Plants, O. A. Stevens stated, regarding this grass, "Specimens were received in 1935 from Gust Steinhaus of Max, McLean County, and were identified by J. R. Swallen, who commented that it was the first record for the United States."

*Description.*—Resembles common meadow foxtail (*Alopecurus pratensis* L.), but has more vigorous rhizomes and broader leaves. Seed black at maturity; spikelets fall away easily, making seed harvest somewhat difficult. Field tested in mountain meadow areas of Montana and Wyoming and

in wetland areas of North and South Dakota. Well adapted to wetland sites. Produces good yields of high-quality forage under these conditions. Tested as NDG-772.

*Released.*—Cooperatively by Wyoming Agricultural Experiment Station, Laramie, and Plant Materials Center, SCS, Bismarck.

*Breeder Seed.*—Plant Materials Center, SCS, Bismarck.

*Certified Seed.*—Available.

#### P-14762

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—(P-111), P.I. 110067, botanic garden Alma-Ata, U.S.S.R., and (P-124), P.I. 110351, Institute of Plant Industry, Leningrad, U.S.S.R.; introduced by Westover-Enlow expedition in 1934.

*Method of Breeding.*—Selected plants from original planting cloned into spaced, isolated, polycross nursery in 1948. F<sub>2</sub> seed produced by open pollination under isolation from other strains. In 1955, 1.8-acre planting made; in 1956, F<sub>3</sub> seed harvested.

*Description.*—Leafy, long lived, sod forming. Foliage dark green; leaves flat and mostly basal. Stems erect, medium coarse, abundant. Plants start growth early in spring and mature seed early. Seed mostly black, short awned to awnless; seed habits fair; seed ripens more uniformly than most strains; shatters readily. Foliage stays green after seed matures and until heavy frost, or as long as moisture available. Best adapted to conservation plantings in wet or poorly drained areas.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

### *Alopecurus pratensis* L., meadow foxtail

Cool-season, slightly spreading bunchgrass introduced in mid-1800's from Eurasia. Used for hay, pasture, and silage in Northern United States, especially in Pacific Northwest. Weak rhizomes. Matures earlier than timothy. Well adapted at

high altitudes and northern latitudes and for use in wetland pastures. Fluffy seed character and excessive shattering restrict seeding. Varieties not available.

### *Ammophila arenaria* (L.) Link, European beachgrass

Cool-season, rhizomatous grass from Europe. Used to control shifting dunes in coastal regions. Dies out when sand ceases to move; not suitable

for permanent erosion control. Propagated vegetatively. Varieties not available.

### *Ammophila breviligulata* Fernald, American beachgrass

Cool-season, rhizomatous, native grass. Occurs on shores of Great Lakes, along Atlantic coast from Newfoundland to North Carolina, and spar-

ingly on Pacific coast. Used for initial sand-dune stabilization. Propagated vegetatively. Varieties not available.

### *Andropogon* spp. (also *Bothriochloa* and *Dichanthium* spp.), bluestems

Bluestems are major rangegrasses in North America. Native species include little bluestem (*Andropogon scoparius*), big bluestem (*A. gerardi*), sand bluestem (*A. hallii*), and several weedy species represented by ubiquitous broom-sedge (*A. virginicus*). In general, bluestems introduced from Old World have been placed under *Andropogon*. However, most Old World species

have been identified recently according to names applied in regions from where they were introduced, i.e., either as species of *Bothriochloa* or *Dichanthium*.<sup>2</sup>

<sup>2</sup>Celazier, R. P., and Harlan, J. R. Studies on Old World Bluestems. Okla. Agr. Expt. Sta. Tech. Bul. T-58. 31 pp. 1955.

***Adropogon annulatus* Forsk. (*Dichanthium annulatum* Stapf, *D. annulatum* complex),  
Diaz bluestem**

Warm-season, erect to semidecumbent bunchgrass from Union of South Africa. Shows promise as pasture plant in southern Texas.

**KLEBERG**

Selected at Kingsville, Tex.—N. R. Diaz.

*Source*.—Seed collected from weakened rhodesgrass pasture on King Ranch, Tex., where escaped bluestem was dominant. Growing beside King Ranch bluestem and found at same time, 1939.

*Method of Breeding*.—Increased at SCS Nursery, San Antonio, Tex.

*Description*.—Plants erect, uniform. Stems slender, nodes with prominent ring of stiff hairs, leafy; stems about 30 inches at seed maturity. Good seed producer, volunteers aggressively. Excellent drought tolerance, some salinity tolerance. Relished by cattle. Adapted for range seeding in medium- to fine-textured soils of eastern Edwards Plateau, Rio Grande plain, blackland prairies, Grand Prairie, and coastal prairie of Texas.

*Released*.—Informally by SCS about 1944.

*Breeder Seed*.—Plant Materials Center, SCS, San Antonio.

*Certified Seed*.—Not available. (In commercial production.)

**PRETORIA 90**

Selected at SCS Nursery, San Antonio, Tex.—James E. Smith, Jr.

*Source*.—Introduced from Transvaal, Union of South Africa, as P.I. 188926, BN-6730; received in April 1951 from F. J. Crider as *Dichanthium annulatum* Stapf. Increased for testing as T-20090.

*Method of Breeding*.—Selected from group of similar accessions from Union of South Africa.

*Description*.—Selection made on basis of seedling vigor, rapid growth, forage yield, and aggressive spread by self-seeding. Somewhat low in seed production. Good drought tolerance. Plants essentially bunchgrass, but stems in contact with moist soil will root at nodes to form loose turf; stems leafy and may reach 5 feet at seed maturity. Green forage and hay relished by cattle. Best use as hay, pasture, or silage on heavy soils of Rio Grande plain, southern blackland, and coastal prairie in Texas.

*Released*.—Informally by SCS in 1954.

*Breeder Seed*.—Plant Materials Center, SCS, San Antonio.

*Certified Seed*.—Not available. (Limited commercial production.)

***Andropogon caucasicus* Trin. (*Bothriochloa caucasicus* C. E. Hubb., *B. intermedia* complex),  
Caucasian bluestem**

Warm-season bunchgrass from U.S.S.R. Used for pasture and hay in central and southern Great Plains.

**CAUCASIAN**

Increased at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius and M. D. Atkins.

*Source*.—Introduced from Tiflis, U.S.S.R., in 1929 as P.I. 78758. Seed obtained in 1934 from A. E. Aldous, Kansas Agricultural Experiment Station, Manhattan. Increased for testing as KG-40.

*Method of Breeding*.—Increased without selection.

*Description*.—Bunchgrass with good leafiness, fine stems, and forage production approximately equivalent to that of native little bluestem at Manhattan. Free from disease. Indeterminate seed maturity makes it difficult to harvest; seed yields poor to fair; easily established and spreads well

from seed. Best adapted in central Kansas, western Oklahoma, and central Texas. Annual precipitation of 18 inches or above. Does best on medium- and fine-textured soils, but will grow on sandy soil. Used alone for summer pasture, for stabilization of earth structures, diversions, and critical areas, and to lesser extent with grass mixtures in range seedings and waterway plantings to provide quick cover. In Kansas reaches maturity in early summer and thereafter is less palatable than native bluestems, blue grama, and sideoats grama.

*Released*.—Not formally, but has come into use primarily through seed harvests from field tests.

*Breeder Seed*.—Plant Materials Center, SCS, Manhattan.

*Certified Seed*.—Not available. (Available commercially.)

### ***Andropogon gerardi* Vitman, big bluestem**

Important warm-season grass on relatively fertile, well-drained loam soils along eastern edge of Great Plains from North Dakota to eastern Texas. Used for pasture and hay. Has deep roots, short rhizomes, and some lateral spread.

#### **CHAMP**

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

*Source.*—Domestic collections in Nebraska by L. C. Newell, D. E. Atkinson, and R. D. Staten. Iowa introductions supplied by SCS.

*Method of Breeding.*—Clones with good vegetative spread and large caryopses from five north-central Nebraska sandhill sources reciprocally crossed with clones from prairie sources, two of which derived from Iowa introductions and three from Pawnee County, Nebr. Resulting 10 progeny lines grown, and eight Synthetic 1 clones from each moved to crossing block. Seed from 80 clones used to establish small field of seeded rows (Synthetic 2 of original cross) for production of breeder seed. Name "Champ" derived from sources of germ plasm: Ch-Cherry and Holt Counties, Nebr.; am-Ames, Iowa; and p-Pawnee County, Nebr.

*Description.*—Moderately late maturing, but ordinarily week to 10 days earlier in seed maturity than Pawnee. Leafy; variable in awn length, culm, glume color (yellow green to purple), and foliage color (light green to glaucous gray). Seed set and seed quality superior to those of ordinary bluestem. Performed well in several forage-yield tests in Nebraska, especially on sandy and fine-textured soils in area of adaptation. May be grown for seed production in central and eastern Nebraska as far north as central Platte and lower Loup and Elkhorn Valleys. Seed should be produced in irrigated rows. For conservation and forage use it may be utilized in solid stands or mixtures.

*Released.*—1963, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in 1965.

#### **KAW**

Selected at Kansas Agricultural Experiment Station, Manhattan.

*Source.*—Composite of lines selected after four or more generations from progeny of 200 acces-

sions collected in 1935 in native Flint Hills grasslands south of Manhattan.

*Description.*—Tall and more uniformly leafy than field-run types. Medium late in maturity. Somewhat resistant to rust. Forage yields greater in plot tests than those of field-run accessions with which it has been compared. Seed yields relatively high and seed set good.

*Released.*—1950, by Kansas Agricultural Experiment Station.

*Breeder Seed.*—Kansas Agricultural Experiment Station.

*Certified Seed.*—Available.

#### **PAWNEE**

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

*Source.*—Collected in 1938 from Pawnee County by L. C. Newell and D. E. Atkinson.

*Method of Breeding.*—Collections propagated through several generations. Clones of four types selected in 1948, polycrossed in isolation, and polycross tested in 1950–51. Approximately 260 clones selected from polycrossed progenies and moved to new crossing block for recombination. These clones subsequently progeny tested in 1953–54. Seed of 1959 and 1960 harvests from duplicate plants of recombination crossing block used as breeder seed (Synthetic 1) for foundation seed field establishment in 1961.

*Description.*—Typical of big bluestem of central prairies. Moderately long, dark-green leaves and tall flowering stalks, with forked, green to purplish inflorescences. Florets of spikelets long awned. Considerable variation in amount of pubescence in seed heads. Produces good forage yields in Nebraska; superior to native strains originating farther north and west. Seed yields and seed quality produced in cultivated rows and under irrigation superior to those of common strains of bluestem. Seed maturity late, approaching frost date in southeastern Nebraska. Recommended in eastern third of Nebraska for conservation and forage, where it may be grown on dryland sites suitable for bluestem production or under irrigation, either in pure stands or mixtures. Seed should be produced in rows under irrigation.

*Released.*—1963, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in 1965.



***Andropogon hallii* Hack., sand bluestem**

Warm-season grass. Resembles big bluestem, but differs in having conspicuous hairs on panicle, more vigorous rhizomes, and greater lateral spread. Plants intermediate between typical big and sand bluestem are common. Valuable range-grass on deep, sandy soils from central Nebraska into eastern Colorado and south into New Mexico and Oklahoma.

**CARSON**

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—John McDermand.

*Source.*—Composite of seed from five clones selected for leafiness and seed production. Also seed collected by SCS personnel in 1959 and 1960 from abandoned field few miles north of Carson, N. Dak.

*Method of Breeding.*—Increase of seed from selected clones and field collection of seed. Tested as PM-ND-329.

*Description.*—Good vigor and leafiness. Free from disease. Well adapted to western North Dakota, South Dakota, eastern Wyoming, and Montana.

*Released.*—No. Distributed for field testing in 1964.

*Breeder Seed.*—Plant Materials Center, SCS, Bismarck.

**CHERRY**

Increased at University of Nebraska Foundation Seed Division Field, Genoa, Nebr.—Murray Cox.

*Source.*—Bulk collection from combine harvest in sandhills of Cherry County, Nebr. Collected by Murray Cox, SCS, October 2, 1957.

*Method of Breeding.*—Increase of bulk collection.

*Description.*—Good seed yield. Best adapted in northern half of Nebraska sandhills and in adjacent South Dakota.

*Released.*—1961, by SCS to provide adapted seed source for Nebraska sandhills.

*Breeder Seed.*—University of Nebraska Foundation Seed Division.

*Certified Seed.*—Not available.

**ELIDA**

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collection in 1956 from native stand on sand-dune area near Elida, N. Mex., at elevation of 4,345 feet and annual precipitation about 16 inches.

*Method of Breeding.*—Direct increase of original collection. Field tested as PM-NM-14.

*Description.*—Somewhat variable, but more uniform than many other collections. Good foliage extending well up culms. Fairly uniform in ripening and better than other strains tested in seed production. Shows superior establishment, vigor, and production in eastern New Mexico.

*Released.*—1963, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Not available.

**GARDEN**

Increased at Plant Materials Center, SCS, Scottsbluff, Nebr.—Murray Cox.

*Source.*—Composite of several individual collections from native plants. Collected by Murray Cox and Robert L. Carver, SCS, October 1, 1957.

*Method of Breeding.*—Increase of composite of individual collections. Field tested as PM-NB-378 in several parts of Nebraska and South Dakota.

*Description.*—Vigorous, tall, leafy type. Good seed yields. Well adapted throughout sandhills of Nebraska and in adjacent South Dakota.

*Released.*—1960, by Plant Materials Center, SCS, Scottsbluff.

*Breeder Seed.*—Plant Materials Center, SCS, Scottsbluff.

*Certified Seed.*—Not available.

**WOODWARD**

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan and W. R. Kneebone.

*Source.*—Traces to source nursery established by M. L. Peterson in 1942. Sources about equally divided between those in and near Woodward County, Okla., and those in general vicinity of Clovis, N. Mex.

*Method of Breeding.*—Plants selected for high seed set and placed in six isolation blocks by J. R. Harlan: Short-early, short-late, medium-early, medium-late, tall-early, and tall-late. Process repeated with separate populations established in 1946. Selected plants moved to six new isolation blocks. Seed from two medium blocks bulked and seeded for preliminary increase in 1949, refined somewhat by removal of excessively tall plants, and today serves as breeder seed block of Woodward sand bluestem.

*Description.*—Variable population, but with most plants similar in type. Superior to wild strains tested in flower production, seed set, lack

of excessively tall plants, and leafiness. Forage yield comparable to that of better source strains. Woodward can be combined reasonably well; seed quality superior to common sources.

*Released.*—1955, cooperatively by Oklahoma

and Kansas (Manhattan) Agricultural Experiment Stations and Crops Research Division, ARS.

*Breeder Seed.*—U.S. Southern Great Plains Field Station.

*Certified Seed.*—Available.

### ***Andropogon ischaemum* L. (*Bothriochloa ischaemum* Keng.), yellow bluestem**

Warm-season, semiprostrate bunchgrass from U.S.S.R., China, Turkey, and India. Used primarily for pasture in Texas and north to southwestern Oklahoma.

#### **A-1407**

Increased at Plant Materials Center, SCS, Tucson, Ariz.—C. G. Marshall and L. P. Hamilton.

*Source.*—Introduced from U.S.S.R. as P.I. 107017 in 1934. Collected by Westover-Enlow expedition at Tajikistan, Turkestan.

*Description.*—Vigorous introduction. Appears more erect and more cold hardy than King Ranch bluestem. Looked promising in central Arizona. Persisted in field plantings established by former SCS Nursery, Albuquerque, N. Mex. Could be useful special-purpose grass in erosion control.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Centers, SCS, Tucson and Los Lunas, N. Mex.

#### **A-14207**

Increased at Plant Materials Center, SCS, Tucson, Ariz.—C. G. Marshall and L. P. Hamilton.

*Source.*—Origin cannot be established. Seed obtained from Texas as little bluestem. Looked promising in some Arizona plantings. Collected and sent to Tucson by Fred Lavin.

*Description.*—Similar to A-1407, but appears to be superior in forage production. Panicle resembles that of Caucasian bluestem. Growth more erect than King Ranch bluestem.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Tucson.

#### **EL KAN**

Selected at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius.

*Source.*—Seed collected in 1937 west of Howard, Elk County, Kans. Exact origin unknown, but thought to have come in with cattle or hay from Texas.

*Method of Breeding.*—Selected in comparison with other introductions of this Asiatic bluestem. Increased from original collection and tested as KG-495.

*Description.*—Most winter hardy strain of *Andropogon ischaemum* tested at Manhattan.

Fully winter hardy in Kansas and eastern Colorado. Bunchgrass of medium leafiness and forage production; more nearly equal in forage production to sideoats grama than to native bluestems in eastern Kansas; not equal in production to Caucasian bluestem where latter can be grown. Low in palatability compared with native bluestems, blue grama, and sideoats grama. Only fair seed production, but usually produces two seed crops a year. Free from disease. Easily established and spreads well from seed. Adapted in Kansas, Oklahoma, eastern Colorado, and north-eastern New Mexico where annual precipitation is 15 inches or above. In South and Southwest not equal to King Ranch, A-14207, and other strains of this species, but its use extends north where King Ranch is not winter hardy. Will grow on sandy, medium-textured, and clay soils. Used alone as summer pasture and for stabilization of earth structures, diversions, and critical areas.

*Released.*—Not formally. Very limited use from seed harvested from field test plantings.

*Breeder Seed.*—Plant Materials Center, SCS, Manhattan.

*Certified Seed.*—Not available.

#### **FORMOSA**

Increased at Oklahoma Agricultural Experiment Station, Stillwater, ARS cooperating—J. R. Harlan.

*Source.*—Seed lot received in 1952 from Mr. Chu of Formosa. Two robust plants increased.

*Description.*—Songarica type of *Bothriochloa ischaemum* Keng; hexaploid. Differs from King Ranch bluestem in being extremely leafy and rather late in blooming. Susceptible to leaf rust, but not so much so as King Ranch bluestem. Overwintered at Stillwater, but injury suggests marginal adaptation in this respect. Strongly apomictic. Should be tested on good soils where high production and intensive management are anticipated.

*Released.*—No.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

#### **KING RANCH (KR)**

Selected at Kingsville, Tex., by N. R. Diaz; then grown at SCS Nursery, San Antonio, Tex.

*Source.*—Original seed collected in weakened rhodesgrass pasture on King Ranch, Tex., where escaped bluestem had gained dominance. Country of origin unknown, but thought by some to be China. Increased for testing as T-3487.

Origin of King Ranch bluestem in America described by J. R. Harlan in Oklahoma Forage Leaflet No. 11, 1952, as follows: Material now generally in use was first noticed by Nico Diaz on King Ranch in 1937 and increased for distribution by SCS under T-3487. Recent inquiry into history of Texas yellow beardgrass, which is apparently indistinguishable from King Ranch bluestem in all respects, leaves little doubt as to original entry of grass into United States. History is briefly as follows:

January 11, 1917—Received by P. B. Kennedy, California Agricultural Experiment Station, Berkeley, from Amoy, China. Presented by H. Hoyle Sink, American consul, Amoy. Given California number T.O. 144 and later S.P.I. number 44096.

1924—S.P.I. 44096 introduced to Substation 3, Angleton, Tex., by V. E. Hafner, former Bureau of Plant Industry, Washington, D.C., and given Texas number T.S. 8413.

April 11, 1932—T.O. 144 received by former Division of Forage Crops and Diseases, Bureau of Plant Industry, Washington, D.C., from Agronomy Department, University of California, Davis, and given F.C. number 21785.

April 11, 1935—F.C. 21785 sent to B. F. Kiltz, Oklahoma Agricultural Experiment Station, Stillwater, from Beltsville, Md.

1937—F.C. 21785 obtained by U.S. Southern Great Plains Field Station, Woodward, Okla., from Stillwater.

1937—F.C. 21785 obtained by Texas Agricultural Experiment Station, College Station, from Woodward.

1939—T.S. 8413 given name "yellow beardgrass" in Texas Agricultural Experiment Station Bulletin No. 570 and its performance at Angleton described.

1949—F.C. 21785 given name "Texas yellow beardgrass" and released for certification in Texas by Texas Agricultural Experiment Station. All *Andropogon ischaemum* material furnished by Texas Agricultural Experiment Sta-

tion to individuals or substations since 1941 originated from this source.

Since original Chinese material had been grown at Substation 3, Angleton, as early as 1924, little reason to suppose that King Ranch strain is any other than Chinese accession that found its way from Angleton to King Ranch sometime during 1924-37.

*Description.*—Midtall, perennial, warm-season bunchgrass. Forms semiprostrate leafy clumps in early stages of growth. Drought tolerant; able to withstand winter temperatures as far north as central Oklahoma. Produces seed indeterminately throughout season, volunteers aggressively, tends to eliminate other competition. Adapted best for range seeding on clay soils and rocky, limestone hills. Forage attractive to cattle and sheep; plants can withstand heavy use for relatively long periods. Leaf growth very susceptible to damage from leaf rust, especially in spring. Weakness did not show up as major factor until grass had been in widespread use for several years.

*Released.*—Informally by SCS about 1941. Later certified and formally released by SCS and Texas Agricultural Experiment Station.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (In commercial production.)

#### MARASH

Increased at Oklahoma Agricultural Experiment Station, Stillwater, ARS cooperating—J. R. Harlan.

*Source.*—Collected by J. R. Harlan in Maras, Turkey, in 1948 and introduced as P.I. 172720.

*Description.*—Belongs to common Eurasian type of *Bothriochloa ischaemum*, but is hexaploid rather than tetraploid. Considerably more robust than other accessions of this type. Resembles El Kan in general ecological behavior and gross appearance; also apomictic. Larger, coarser, more robust, and bluish; weedy. Produces seed abundantly and continuously through growing season and should volunteer readily. Winter hardy in Oklahoma. Resistant to leaf rust. Slow starter.

*Released.*—No.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

#### *Andropogon nodosus* (Willem.) Nash (*Dichanthium caricosum* A. Camus, *D. caricosum* complex)

Warm-season, semidecumbent bunchgrass from India. Used for pasture and hay in humid parts of gulf coast plains of Texas.

#### ANGLETON

Increased at Substation 3, Angleton, Tex.

*Source*.—Received at Substation 3, Angleton, as S.P.I. 34934 in 1915. Plants provided by C. V. Piper, who obtained accession from W. Burns of Poona Agricultural College, Poona, India. Identified as *Andropogon annulatus*.

*Method of Breeding*.—Direct increase of original introduction.

*Description*.—Palatable grass. Fine stems; many slender, easily cured leaves; decumbent stems produce roots at nodes that are in contact with soil. High water requirement, some drought tolerance, and fair salt tolerance. Well adapted to coastal parts of Texas that receive at least 30 inches of annual rainfall.

*Released*.—Informally by Substation 3, Angleton, in 1924.

*Breeder Seed*.—Not available.

*Certified Seed*.—Not available. (Limited commercial production.)

### GORDO

Selected at SCS Nursery, San Antonio, Tex.—David H. Foster.

*Source*.—Introduced from Union of South Africa as P.I. 190302, BN-6851; increased for testing as T-20062. Received April 1951 as *Andropogon* sp.

*Method of Breeding*.—Selected after comparison with several similar accessions from Africa.

*Description*.—Unlike other forms of *A. nodosus* known in Texas. Seedlings prostrate until seed stems produced in fall; then plants grow erect. Seedlings vigorous, establish readily. Plants leafy, dark green; stems often 6 feet at seed maturity. Established stands commence growth late in spring, but grow rapidly during summer and fall. Good seed producer. Forage relished by cattle. Adapted in Texas for pasture planting in heavy soils of coastal prairie, Rio Grande plain, and southern part of blackland prairie.

*Released*.—Informally by SCS in 1957.

*Breeder Seed*.—Plant Materials Center, SCS, San Antonio.

*Certified Seed*.—Not available. (Ample commercial supplies.)

### MEDIO

Increased at SCS Nursery, San Antonio, Tex.—James E. Smith, Jr.

*Source*.—Medio Creek, Bee County, Tex., near State Highway 202 bridge. Lines lower benches of Medio Creek from near Berclair to Copano Bay and evidently been in place for many years. All other except woody vegetation excluded by grass where it is established. Apparently first noticed by Dick Sentor, SCS, about 1940. Failed to reproduce it. In February 1951 Simon E. Wolff, SCS Nursery, San Antonio, with Roy Boethel and Alfred Taylor, Beeville SCS Work Unit, collected five sod clumps, which were taken to San Antonio by Wolff, divided, set out in two rod rows, and given accession number T-20011. Country of origin unknown.

*Method of Breeding*.—Increase of bulk material from natural stand on Medio Creek.

*Description*.—Leafy, dark green, fine stemmed. Perennial form of *Andropogon nodosus*. Reproduces well by self-seeding; spreads rapidly by means of prostrate stems to form dense turf, with upright stems about 30 inches tall at seed maturity. Tolerant to alkaline soils and low rainfall. Good seed producer. Grows best in clay soils or sandy soils with shallow clay layer. Capable of very high forage production; both green and cured forage taken by cattle in preference to most native and other introduced grasses. Area of best adaptation for pasture and waterway is Rio Grande plain, blackland prairie south and east of Austin, Tex., and coastal prairie.

*Released*.—Informally by SCS in 1954.

*Breeder Seed*.—Plant Materials Center, SCS, San Antonio.

*Certified Seed*.—Not available. (In commercial production.)

### *Andropogon scoparius* Michx., little bluestem

Important warm-season bunchgrass. Widely distributed throughout Eastern and Central United States. Valuable range grass in Flint Hills of east-central Kansas and Oklahoma. More drought resistant and found in more westerly and drier parts of Great Plains than big bluestem.

#### KG-1580

Selected at Kansas Agricultural Experiment Station, Manhattan—A. E. Aldous.

*Source*.—Accessions collected in 1935 from Flint Hills native grasslands south of Manhattan.

*Method of Breeding*.—Composite of progeny of these accessions made after several generations of selection.

*Description*.—Tall, leafy, vigorous, medium late in maturity, more uniform than field-run accessions. High producer of forage and, under favorable conditions, also of seed. Some resistance to rust.

*Released*.—No.

*Breeder Seed*.—Kansas Agricultural Experiment Station.

**PASTURA**

Selected at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collections made in 1956 and 1957 near Rowe and Pecos, N. Mex., at elevation of 6,500–6,900 feet and average annual precipitation of 14 inches.

*Method of Breeding.*—Increase of original collection. Field tested as PM-NM-272.

*Description.*—True green, fairly uniform growth, excellent seedling vigor, and resistance to climatic adversities. Herbage production only average, but seed production high, with processing less of problem than with many strains because of less villous inflorescence. Widely scattered field tests show strain is well adapted for sites where species is recommended in central and eastern New Mexico and in eastern Colorado.

*Released.*—1963, cooperatively by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Not available. (Limited commercial production.)

**PM-K-152**

Increased at Plant Materials Center, SCS, Manhattan, Kans.—R. D. Lippert.

*Source.*—Collected from many sites in southwest Kansas and Panhandle of Oklahoma by SCS personnel in 1959 at approximate elevation of 2,500–3,500 feet and precipitation of 15–20 inches.

*Method of Breeding.*—Collections bulked to establish increase field. Natural selection under combine harvesting for more uniform maturity.

*Description.*—Variable leafiness and forage and seed yields. Somewhat more uniform in maturity than original source.

*Released.*—Not formally. Increased for field testing in western Kansas, western Oklahoma, and High Plains of Texas.

*Breeder Seed.*—Plant Materials Center, SCS, Manhattan.

***Arrhenatherum elatius* (L.) Presl, tall oatgrass**

Cool-season bunchgrass from Europe. Used for pasture, hay, and in forage mixtures in Northeastern and North-Central States and in parts of intermountain region and Pacific Northwest. Some tolerance to shade, rapid seedling development, short lived. Under irrigation, life cycle similar to that of red clover. Seed shatters at maturity.

**TUALATIN (Reg. No. 3)**

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

*Method of Breeding.*—First selections made in

1930 in attempt to develop strain for nonshattering seed characteristics.

*Description.*—Leafier, finer stemmed, and about 10 days later in heading than common tall oatgrass; not quite so tall. Forage yields equal under comparable growing conditions; seed yields considerably higher because of resistance to shattering. Highly resistant to head smut, which readily attacks commercial type.

*Released.*—1940, cooperatively by Oregon Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Oregon Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

***Axonopus affinis* Chase, carpetgrass**

Warm-season, sod-forming grass indigenous to Central America and West Indies. Widely distributed in old permanent pastures in Southeastern United States. Used for lawns in Florida and

lowlands of Coastal Plain. Lacks drought resistance; makes best growth on lowland soils. Not highly nutritious, but quality and yield improved by fertilizer applications. Varieties not available.

***Bouteloua curtipendula* (Michx.) Torr., sideoats grama**

Major warm-season, slightly spreading, native bunchgrass. Distributed over much of Eastern and Central United States; important range grass in central and southern Great Plains from central

Nebraska to southern Texas. Grows in association with bluestems; less drought resistant than blue grama.

**BUTTE (Reg. No. 2)**

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—E. C. Conard and L. C. Newell.

*Source.*—Native collections from Holt and Platte Counties, Nebr.

*Method of Breeding.*—Repeated field plantings revealed superiority of seedling vigor and establishment by native collections from Holt and Platte Counties as compared with other sources. Collections eventually combined and increased for further testing as Nebraska 37. Seed distributed for testing in 1948.

*Description.*—Winter hardy, long lived, relatively early maturing. Makes best growth response under long days; best adapted to areas with relatively short growing seasons. Has large caryopses; exhibits excellent seedling vigor for establishment. In eastern Nebraska produces excellent seed crop, maturing in mid-August; matures seed before frost in western Nebraska. In Nebraska recommended for upland plantings in north-central and western districts.

*Released.*—1958, cooperatively by Nebraska Agricultural Experiment Station; Crops Research Division, ARS; and Nursery Division, SCS. Increased on limited generation basis; foundation, registered and certified, with no recertification of certified class.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available.

**CORONADO (Reg. No. 1)**

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan.

*Source.*—Field collection made by J. R. Harlan in 1946. Collected in small, dry wash 1½ miles west of "Encinosa," N. Mex.

*Method of Breeding.*—Increased at Woodward. Some plants died during first two winters, but no evidence since of winter injury; presumed non-hardy types have been eliminated. Seed distributed for testing under name "Encinosa."

*Description.*—Apomictic, rather robust, productive of both forage and seed, extremely uniform. Spikes tend to be straw colored at maturity; tips of inflorescences characteristically turn white as spikes ripen. Seed large; seed set under favorable conditions good; seedling vigor excellent. Two crops of seed per year may be expected, as in most apomictic varieties.

*Released.*—1955, cooperatively by Oklahoma Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

*Certified Seed.*—Available.

**EL RENO**

Increased at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius.

*Source.*—Field seed collection from native range near El Reno, Okla., in 1934.

*Method of Breeding.*—Bulk material compared with many other collections at Manhattan. Increased for testing as KG-482.

*Description.*—Outstanding in leafiness, forage production, and vigor. Ranked well in disease resistance, seed production, and winter hardiness. Yields of 500 pounds of seed per acre and above are common under irrigation. Widely used in range seedings and widely adapted in Kansas, Oklahoma, and Texas.

*Released.*—1944, cooperatively by Kansas Agricultural Experiment Station and Plant Materials Center, SCS, Manhattan.

*Breeder Seed.*—Plant Materials Center, SCS, Manhattan.

*Certified Seed.*—Available.

**PIERRE**

Increased at Plant Materials Center, SCS, Bismarck, N. Dak.—John McDermand.

*Source.*—Composite of seed collected 5 miles west of Pierre, Stanley County, S. Dak., by SCS in 1954 from several plants with outstanding vigor and leafiness growing in native range on south slope of shale range site; average annual precipitation approximately 16 inches.

*Method of Breeding.*—Compared with other field collections and selected for increase. Tested as PM-SD-251.

*Description.*—Outstanding in vigor, leafiness, and freedom from disease. Compares well with other accessions in forage and seed production. In rod row evaluation plantings, hand harvested, at Bismarck, Pierre yielded 483 pounds of seed per acre compared with 179 for Butte. Newly established seed-increase field with supplemental irrigation and machine harvested yielded 190 pounds of clean seed per acre in 1963. Showed promise in range seedings in western half of South Dakota and in adjoining areas of bordering States.

*Released.*—No. Distributed for field testing.

*Breeder Seed.*—Plant Materials Center, SCS, Bismarck.

**PREMIER**

Selected at Texas Agricultural Experiment Station, College Station, ARS and SCS cooperating—Judd Morrow and Wayne G. McCully.

*Source.*—Seed collected from single plant growing between Cuauhtemoc and Chihuahua, Mexico, in 1953.

*Method of Breeding.*—Increased at Big Spring Field Station, Big Spring, Tex., and evaluated at several research centers in State in comparison with many other collections. Increased for testing as G-433.

*Description.*—Upright, leafy type. Good seed yield. Individual spikes retained on plant make combine seed harvest practical. Germinates readily and seedlings develop rapidly following emergence. No major insect or disease problems noted. Considerable drought tolerance. Forage production equal to or slightly greater than that of other recognized varieties. Recommended for west-central Texas.

*Released.*—1960, cooperatively by Texas Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Texas Agricultural Experiment Station.

*Certified Seed.*—Available.

#### TRAILWAY

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell and E. C. Conard.

*Source.*—Hybrid population of sideoats grama found growing along abandoned roadway in northern Holt County, Nebr., by L. C. Newell in 1935.

*Method of Selection.*—Spaced plants of collection grown at Nebraska Agricultural Experiment Station. Selection made in hybrid population for late maturity and freedom from rust. Selection carried through three generations, resulting in harvest and increase of seed from several groupings of selected clones. Seed from these groups combined for increase and testing as Nebraska 52.

*Description.*—Winter hardy, long lived, late maturing, comparable in growth type to more southerly varieties as to origin. Somewhat indeterminate as to heading and flowering responses, exhibiting considerable variability in maturity. Requires most of growing season to mature seed in eastern Nebraska; may fail to produce seed crops in regions with shorter seasons. In Nebraska recommended for upland plantings in eastern and southern districts.

*Released.*—1958, cooperatively by Nebraska Agricultural Experiment Station; Crops Research Division, ARS; and Nursery Division, SCS. Increased on limited generation basis; foundation, registered and certified, with no recertification of certified class.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available.

#### TUCSON

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater.

*Source.*—Field collection made near Douglas, Ariz., by SCS. Reached Woodward by way of Lincoln, Nebr., in 1937.

*Method of Breeding.*—Considerable mortality and much winter injury observed in population for first several years. Selection of surviving types resulted in material adequately hardy for most of Oklahoma.

*Description.*—Consists of group of apomictic clones that resemble each other very closely. Outstanding in ability to grow under hot, dry conditions; remains green when most sexual types dry up. Two seed crops harvested each year, but inferior to Coronado in seed set, seed size, and seedling vigor. Became obsolete in Oklahoma with release of Coronado, but used elsewhere in Southwest.

*Released.*—Cooperatively by Crops Research Division, ARS, and Oklahoma Agricultural Experiment Station.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

*Certified Seed.*—Available.

#### UVALDE

Increased at southwestern SCS nurseries—Gordon Mott.

*Source.*—Original seed collected from native stand along railroad right-of-way about 1½ miles west of Knippa, Tex. Seed first planted at Stillwater, Okla., and later put in production at SCS Nursery, Tucson, Ariz. Quantity of seed sent from Tucson to San Antonio, Tex., in 1952, and commercial production started. Named Uvalde for county of origin. Increased for testing as T-20285 (Tex.) and A-2969 (Ariz.).

*Description.*—Dark green, erect, very leafy. Heavy seed producer; superior to common forms of species in resistance to shattering at seed maturity. Represents first southern Texas variety to be produced commercially. Area of best adaptation probably within 100–150 miles of Uvalde, though plantings thriving as far away as Midland and Spur, Tex. Proved less desirable than local sources in Arizona and New Mexico because of winter-stand loss at higher elevations there.

*Released.*—1950, cooperatively by Arizona Agricultural Experiment Station, Tucson, and Nursery Division, SCS.

*Breeder Seed.*—Plant Materials Center, SCS, Tucson.

*Certified Seed.*—Not available. (In commercial production.)

**VAUGHN**

Increased at former SCS Nursery, Albuquerque, N. Mex.

*Source.*—Collected from native stands near Vaughn, N. Mex., in 1935 and tested as A-3603.

*Method of Breeding.*—Bulk increase of native collection.

*Description.*—Population slightly variable, but all have erect leaf type. Good seedling vigor, easily established. More drought tolerant than El Reno, Uvalde, or Tucson for use in eastern Colorado and New Mexico.

*Released.*—1940, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Nursery Division, SCS.

*Breeder Seed.*—Plant Materials Center, Los Lunas, N. Mex.

*Certified Seed.*—Available in limited quantity.

**WOODWARD STRAINS**

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater. Represent sources and experimental strains that have been distributed for testing purposes.

**Hope**

Apomictic. Collected 15 miles northwest of Hope, N. Mex., by J. R. Harlan in 1946. Medium height, fine stemmed, leafy, very uniform. In several tests has been highest yielding variety, but

seeds small and subject to shattering. Seedling vigor less than that of Coronado.

**Temple**

Fifty plants selected after four cycles of mass selection from material originating near Temple, Tex. Leafy, robust, sexual type.

**W1**

Fifty selected plants from line advanced three generations by selection and isolation. Original source composite of many sources. Vigorous, leafy, forage type. Good seed producer. Light-colored inflorescences predominating. Fairly uniform as to type.

**W2**

Fifty plants selected from three lines (74-6545, 74-6546, 74-6547), each of which had been advanced three generations by selection and isolation and here combined. Leafy, robust types. Somewhat less uniform as to type and more pigmented than W1.

**W3**

Fifty plants selected from four lines, each of which had been advanced two generations by selection and isolation. Original sources composited. Plants exceptionally tall and leaves coming well up stem.

**W4**

Fifty plants selected from same lines as W3. Vigorous, but shorter, medium leafy, and less erect than W3. W4 looked good in some tests; being increased for additional testing.

***Bouteloua eriopoda* (Torr.) Torr., black grama**

Major warm-season, native grass of arid and semiarid desert grasslands in Arizona, New Mexico, and Texas. Culms in contact with soil, with root of nodes under favorable conditions to form near plants. Excellent palatability and feeding value both summer and winter. High drought resistance.

**A-4567-2**

Selected at Arizona Agricultural Experiment Station, Tucson, ARS and SCS cooperating—L. Neal Wright.

*Source.*—Eleven vegetative and forty-seven seed accessions collected in Arizona and New Mexico.

*Method of Breeding.*—Source nursery of 2,067 spaced plants established and observed in 1959. Plants placed in nine types relative to seed production and forage characteristics. Seventy-nine selected plants vegetatively increased and re-

evaluated. Two crossing blocks established, A-4567-1 with 12 selections and A-56-1 with 7 selections. Polycross progenies of each selection evaluated for seed set and forage production. Based on progeny performance, 12 selections vegetatively established in crossing block, A-4567-2.

*Description.*—Sexual,  $2n=20$ , and diploid. Outstanding in leafiness, vigor, forage production, vegetative spread, seed set, and seed production when compared with Flagstaff. High seed set, germination percentage, and seed weight when growth initiated August 1, with 100 pounds per acre of nitrogen fertilizer applied.

*Released.*—No. Proposed for 1965, cooperatively by Arizona Agricultural Experiment Station; Crops Research Division, ARS; and Plant Materials Center, SCS, Tucson.

*Breeder Seed.*—Arizona Agricultural Experiment Station.



**FLAGSTAFF**

Increased at former SCS Nursery, Albuquerque, N. Mex.

*Source.*—Field collection along Flagstaff-Cameron Highway, 20 miles north of Flagstaff, Ariz.

*Method of Breeding.*—Bulk increase from source material collected in 1947. Identified as A-3730.

*Description.*—Variable, but generally not as rank growing and as aggressively spreading by stolons as others tested. Above-average culm production. Adapted at northern and high altitude extremities of black grama range.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—Plant Materials Centers, SCS, Tucson, Ariz., and Los Lunas, N. Mex.

**PM-NM-44**

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collected in 1957 along U.S. 85, about 45 miles south of Socorro, N. Mex., at elevation of 4,400 feet and precipitation about 10-11 inches.

*Method of Breeding.*—Increase of original collection.

*Description.*—Considerable variation in individual spaced plants, but population as whole exhibits desirable characteristics intermediate between upright, fine-stemmed, confined types and decumbent, coarse, sprawling types. High yields of pure live seed.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

***Bouteloua gracilis* (H.B.K.) Lag. ex Steud., blue grama**

Major warm-season, native grass throughout Great Plains. Used for grazing and erosion control. Characterized by creeping growth habit, forms dense sod, and produces high-quality forage. Hardy and drought resistant. Found on various soil types; well adapted on heavy, rolling upland soils.

**LOVINGTON**

Increased at former SCS Nursery, Albuquerque, N. Mex.

*Source.*—Field harvested in 1944 near Lovington, N. Mex., at elevation of 4,000 feet and precipitation about 14 inches.

*Method of Breeding.*—Bulk increase of source material.

*Description.*—Uniformity, good leafiness, excellent seedling vigor, and fast establishment. Used as standard in evaluating other accessions of blue grama at Los Lunas, N. Mex. Seed production under irrigation and with insect control exceeds 200 pounds of pure live seed per acre. Extensive field testing (as accession A-12424) showed it adapted over wide geographic area in Southwest.

*Released.*—1963, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Plant Materials Center, SCS, Los Lunas.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Not available.

**WOODWARD STRAINS**

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater.

Blue grama types extensively distributed in small packet lots over last several years. No large-scale increases obtained because of difficulty of producing seed. Capitan, Synthetic 20, and Synthetic 40 being produced on small scale at El Reno, Okla. Marfa seed produced in limited quantity at Woodward. Most other varieties now obsolete.

**Capitan**

Collection 174 from property of Don Gregorio Herrera, 3 miles north of Capitan, N. Mex., to which selected plants added from collections 173, 175, and 176, all within 15 miles of collection 174. Extremely leafy, vigorous, pure green. Late flowering at Woodward; vegetatively most promising variant so far found. Original type apparently closely confined to one small watershed north of Capitan. Looked outstanding at Central Plains Experimental Range in Colorado and under irrigation at El Reno.

**Caprock**

Collections 92 and 113 within 10 miles of Caprock, N. Mex., plus collection 135 near Kenna, N. Mex. Vigorous strain from edge of Mescalero ridge; somewhat finer than more southern sources.

**Davis**

Selected plants from Davis Mountain collections 28-41, except collection 34. Low growing, very leafy, late flowering, blue, typical of most Davis Mountain types. Vigorous southern type of considerable promise.

**Dunlap**

Collections 120 and 121 near Dunlap, N. Mex., representing high rocky plains west of upper Pecos River. Outstanding forage type.

**Hueco**

Collection 55, 15 miles east of Hueco station, Tex., on lower slopes of Hueco Hills, plus collection 57, 14 miles east of Salt Flats, Tex., on lower slopes of Guadalupe Mountains. Vigorous, medium leafy, bluish, of some promise. High yielder in small plot tests at Woodward.

**Marfa**

Collection 34 from southern slopes of Davis Mountains, 2 miles north of Marfa, Tex., plus selected tall, early plants from Davis Mountain collections 28-41. Tall, leafy, vigorous, early flowering, representative of southern slopes of Davis Mountains. Looked good under grazing at Woodward.

**Pecos**

Collection 107, 26 miles northeast of Carlsbad, N. Mex., plus selected plants from collections 106 and 108 within 10 miles of collection 107. Vigorous, southern type; apparently adapted to dry, sandy conditions of mid-Pecos River Valley. Tall, robust, bluish.

**Roy**

Collection 201 from Red River Canyon west of Roy, N. Mex., plus collection 192 near Santa Rosa, N. Mex. Represents most promising material found in northeastern New Mexico, which area generally provides mediocre material for Woodward conditions. Rather coarse, bluish.

**Ruidoso**

Collections 143 and 145 selected individuals from collection 144, all in Rio Ruidoso watershed between Hondo and Ruidoso, N. Mex. Montane type, but quite different from Capitan, which comes from same mountains. Ruidoso rather coarse, bluish, shorter leaved, and taller stemmed than Capitan.

**Synthetic 20**

One hundred selected plants from sources known to have  $2n=20$  chromosomes. These sources mostly from central New Mexico and western Texas.

(See A Cytological Study of *Bouteloua gracilis* From Western Texas and Eastern New Mexico by L. A. Snyder and J. R. Harlan in Amer. Jour. Bot. 40: 702-707, 1953.)

**Synthetic 40**

One hundred selected plants from sources known to have  $2n=40$  chromosomes. Sources from central New Mexico at fairly high elevations. (See reference above.)

**Van Horn**

Collection 46 plus selected plants from collection 48, both within 10 miles of Van Horn, Tex. Vigorous, leafy, blue-green southern type. Promises to be good seed producer under good conditions.

**W1**

Fifty selected early plants from 1946 collection of blue grama. Wide range of vigorous early types; intercrossing to provide variable material for regional selection.

**W2**

Fifty selected late-flowering plants from 1946 blue grama collection. Wide range of vigorous late types; intercrossing to provide variable material for regional selection.

**W3**

Combining 25 plants of Betzen strain and 25 plants of Noble strain after advancing each three generations by selection and isolation. Betzen material originated on Betzen farm 8 miles south of Woodward. Noble strain came from Noble County, Okla. Strains similar; vigorous, leafy, and very late in flowering.

**W4**

Fifty selected  $F_4$  derivatives from crosses of Mexican Springs (New Mexico)  $\times$  Fort Supply (Oklahoma) and reciprocal. Fairly uniform material intermediate between two original types. Finer, earlier, and greener than local Fort Supply material. Leafier, less spreading, and with better seeding habits than Mexican Springs.

***Bouteloua hirsuta* Lag., hairy grama**

Warm-season, slightly spreading, native grass. Widely distributed in Western United States and south into Mexico and gulf coast region. Adapted to dry, sandy, and sandy-loam soils; drought re-

sistant. Palatable, good source of winter forage. Generally less productive than blue grama. No varieties available; ecotypes collected for seeding tests.

***Bromus arvensis* L., field brome**

Cool-season bunchgrass introduced from Europe in late 1920's. Used as cover crop and for green manure in parts of northeastern and north-central

regions. Winter hardy annual. Develops extensive fibrous root system. Varieties not currently available in United States.

***Bromus carinatus* Hook. and Arn., California brome**

Cool-season, short-lived bunchgrass indigenous to intermountain and Pacific coast regions. Palatable; used for grazing and erosion control. Considered by some botanists to be polymorphic species that includes *Bromus marginatus*.

**CUCAMONGA (Reg. No. 13)**

Selected at Plant Materials Centers, SCS, Pleasanton and San Fernando, Calif.—P. B. Dickey, P. E. Lemmon, and D. J. Vanderwal.

*Source*.—Collection by R. L. Forsyth from native stand near Cucamonga, Calif., in 1939.

*Method of Breeding*.—Mass phenotypic selection from small plot seeded at Pleasanton in 1941. Given accession number P-11117 and tested in comparison with other annual grasses.

*Description*.—Self-perpetuating winter annual; pale green, very rapid developing, early maturing, with long flexuous panicles. Sheaths and leaves sparsely pilose to nearly glabrous; awns long, requiring processing of seed before it can be drilled. Best suited as self-seeding cover crop and as quick cover on droughty, low fertility sites. Limited value for forage because of its short green feed period. Susceptible to head smut.

*Released*.—1949, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

*Breeder Seed*.—Plant Materials Center, SCS, Pleasanton.

*Certified Seed*.—Available.

***Bromus catharticus* Vahl, rescuegrass**

Cool-season bunchgrass from South America. Used primarily for winter pasture in Southern States. Palatable. Subject to head smut. Annual growth habit, but reseeds under favorable conditions; some plants biennial or short-lived perennials.

**CHAPEL HILL**

Increased at SCS Nursery, Chapel Hill, N.C.—F. J. LeClair, Paul Tabor, and L. R. Roof.

*Source*.—From commercial seed, Wyatt Seed Co., Raleigh, N.C.; originally from Nicholson Seed Co., Dallas, Tex.

*Method of Breeding*.—Natural selection for longevity and resistance to smut and mildew.

*Description*.—Vigorous strain, with strong tendency to be perennial at northern border of Cotton Belt. Considerable resistance to smut and mildew in States east of Alabama and Tennessee.

*Released*.—Not formally. Distributed from SCS Nursery, Chapel Hill, in fall of 1947.

*Breeder Seed*.—Not available.

*Certified Seed*.—Not available. (Seed in commercial trade channels often mixed. For pure seed, request names of growers from SCS.)

nursery used to increase strain. Resistant to head smut in artificial inoculation tests.

*Description*.—Experimental strain characterized by resistance to mildew and smut. More uniform than common rescuegrass, having somewhat larger stems, wider and longer leaves, and longer, heavier panicles. Behaved as short-lived perennial under favorable conditions at Experiment.

*Released*.—1963, by Georgia Agricultural Experiment Station.

*Breeder Seed*.—Georgia Agricultural Experiment Station.

*Certified Seed*.—Available.

**LAMONT (Reg. No. 7)**

Selected at Delta Branch Experiment Station, Stoneville, Miss., ARS cooperating—H. W. Johnson.

*Source*.—La Estanzuela 157/49. Seed of this strain obtained by O. S. Aamodt from Uruguay and introduced as P.I. 193144 in 1950.

*Method of Breeding*.—Mass selection. Seed harvested in May 1953 from 2-year-old plants in plot seeded at Stoneville in 1951.

*Description*.—Appears to consist largely of biennials or short-lived perennials. Consequently, provides longer grazing season during second and subsequent years of stand than during year of establishment or when grown as winter annual. Highly resistant to head smut. In tests at Stoneville proved immune to head smut collections from Auburn, Ala., College Station, Tex., Raymond and Stoneville, Miss., and Watkinsville, Ga. Proved moderately susceptible to Baton Rouge, La., collection, which appears to represent different race of head smut fungus.

**GASEL**

Selected at Georgia Agricultural Experiment Station, Experiment—J. M. Elrod.

*Source*.—Plants found growing in old nursery at Experiment in 1950.

*Method of Breeding*.—Individual plants increased vegetatively and used to establish space-planted nursery. Clones screened in greenhouse for resistance to mildew. Seed harvested from

*Released.*—1957, cooperatively by Mississippi Agricultural Experiment Station, State College, and Crops Research Division, ARS.

*Breeder Seed.*—Delta Branch Experiment Station.

*Certified Seed.*—Available.

### PRAIRIE

Selected at Imperial Valley Field Station, El Centro, Calif.—L. G. Goar.

*Source.*—Introduced from New Zealand by Wayne Fisher.

*Method of Breeding.*—Mass selection at El Centro. Increased at Plant Materials Center, SCS, Pleasanton, Calif., for field-scale testing.

*Description.*—Rapid-developing, high-producing, short-lived, perennial bunchgrass. High fertility-level requirement. Very palatable to livestock. Tests showed it produced as much first-year feed in irrigated pasture mixtures as annual and perennial ryegrass and was less competitive to longer lived, slower developing perennial grasses in mixture. Under normal grazing practice disappears from mixture by end of second year.

*Released.*—1946, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

*Breeder Seed.*—California Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### *Bromus inermis* Leyss., smooth brome

Major cool-season, sod-forming grass introduced from Hungary in 1884. Used for pasture, hay, silage, and erosion control in humid Northern States to eastern North Dakota, south to eastern Kansas, and extensively in northern part of intermountain region and Pacific Northwest. Grows well on fertile soils. Rated high in palatability and nutritive value. Two distinct types identified: Northern, which is adapted to western Canada and northern Great Plains, and southern, which is adapted to Corn Belt States and central Great Plains.

### ACHENBACH

*Source.*—Old fields tracing to original planting made in 1895 by Achenbach brothers of Washington County, Kans.

*Method of Breeding.*—Some mass selection in early generations by Achenbach brothers.

*Description.*—Typical southern type of smooth brome. Leafy, vigorous, spreads rapidly by rhizomes to form dense, competitive sod. Heavy producer of both seed and forage. Far less susceptible to leaf diseases than northern types with

### RESCUE 440

Selected at Tennessee Agricultural Experiment Station, Knoxville—J. K. Underwood.

*Source.*—Local naturalized colony.

*Method of Breeding.*—Selection of longer lived plants, high in seed and forage production.

*Description.*—Isolated in 1940 as short-lived perennial of excellent production and quality. Performed very satisfactorily at several locations in Southeast.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—Discontinued.

### TEXAS 46

Selected at Texas Agricultural Experiment Station, College Station—G. C. Warner, R. L. Hensel, and R. C. Potts.

*Source.*—Plant introduction from Australia; P.I. number unknown.

*Method of Breeding.*—Individual plants selected from Australian introduction and increased for testing.

*Description.*—Good seedling vigor, mildew resistance, early growth, good yield of forage and seed.

*Released.*—1946, by Texas Agricultural Experiment Station.

*Breeder Seed.*—Discontinued.

*Certified Seed.*—Not available. (No commercial sources.)

which it has been compared in Kansas. Most smooth brome grown in Kansas is of this strain.

*Released.*—Named Achenbach in 1944 by Kansas Agricultural Experiment Station, Manhattan; old fields that could be traced to Achenbach brothers' plantings then declared eligible for certification. Have been source of all fields now grown for certification.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity.

### B. IN. 12

Selected at Utah Agricultural Experiment Station, Logan, ARS cooperating—W. Keller.

*Source.*—Northern types.

*Method of Breeding.*—Mass selection.

*Description.*—Includes 28 high-yielding, chiefly nonspreading, or restricted-spreading clones. Performed well at higher elevations in some Intermountain States and in northern Great Plains. Has been discontinued.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

**BAYLOR**

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

*Source.*—Parental clones selected from southern varieties.

*Method of Breeding.*—Elite clones selected on basis of outcross progeny performance for forage and seed yield, recovery, seedling vigor, leafiness, and disease resistance. Seven-clone synthetic evaluated in north-central region and Canada as R.P. 101.

*Description.*—High-yielding, disease-resistant southern type; leafy. Good in recovery and stand establishment. Improved production of high-quality seed. Same maturity as Lincoln.

*Released.*—Distributed for testing by Rudy-Patrick Seed Co. in 1962.

*Breeder Seed.*—Rudy-Patrick Seed Co.

*Certified Seed.*—Not available. (Commercial seed available in 1965.)

**BLAIR**

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

*Source.*—Parental clones selected from southern varieties or origins.

*Method of Breeding.*—Selections evaluated in clonal and progeny tests for desirable forage and seed characteristics, with emphasis on leaf disease resistance, leafiness, seed quality, and stand-establishment ability. Eight-clone recombination evaluated in north-central region and in Canada as R.P. 100.

*Description.*—High-yielding, disease-resistant southern type; vigorous, hardy, and leafy. Good stand establishment. Good seed producer, with larger seed than standard southern varieties.

*Released.*—1964, by Rudy-Patrick Seed Co. Distributed for testing in 1962.

*Breeder Seed.*—Rudy-Patrick Seed Co.

*Certified Seed.*—Not available. (Commercial seed available in limited quantity in 1964.)

**CARLTON**

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

*Source.*—Northern common smooth brome.

*Method of Breeding.*—Synthetic of four clones whose polycross progenies excelled in seed yield. Provision made in licensing for alteration and enlargement of four-clone base as better clones of northern type become available.

*Description.*—Typical of northern type. Hay yields 5-10 percent and seed yields 20-30 percent above northern common.

*Released.*—1961, by Canada Department of Agriculture.

*Breeder Seed.*—Canada Agriculture Research Station, Saskatoon.

*Certified Seed.*—Available in 1965.

**ELSBERRY**

Increased at SCS Nursery, Elsberry, Mo.

*Source.*—Believed to be derived from old field located in either northwestern Missouri or southeastern Iowa.

*Description.*—Southern early-maturing strain of smooth brome. Best of several accessions tested at SCS Nursery, Elsberry.

*Released.*—Cooperatively by Missouri Agricultural Experiment Station, Columbia, and Nursery Division, SCS.

*Breeder Seed.*—Missouri Agricultural Experiment Station.

*Certified Seed.*—Not available. (Some commercial production.)

**FISCHER**

Increased at SCS Nursery, Ames, Iowa—M. E. Heath.

*Source.*—Original seed collected in 1939 from old field of smooth brome established in 1917 on E. A. Fischer farm near Shenandoah, Iowa.

*Method of Breeding.*—Original lot of seed planted at SCS Nursery, Ames, in 1940 for increase and subsequent testing by Iowa Agricultural Experiment Station, Ames, and SCS. Several generations of seed increase by SCS and Iowa Agricultural Experiment Station have followed.

*Description.*—Performance tests to date show Fischer to be aggressive, productive, hardy, and well adapted to better soils. In most respects similar to other southern strains—Lincoln and Achenbach.

*Released.*—1943, cooperatively by Iowa Agricultural Experiment Station and Nursery Division, SCS.

*Breeder Seed.*—Iowa Agricultural Experiment Station.

*Certified Seed.*—Not available. (May be available by 1965.)

**HOMESTEADER (Reg. No. 3)**

Developed at South Dakota Agricultural Experiment Station, Brookings—J. G. Ross, W. W. Worzella, and C. J. Franzke.

*Source.*—Seed collected from South Dakota farms on which original plantings had been made some time during 1905-15.

*Method of Breeding.*—Sixteen collections compared in variety tests. Five strains found superior for forage yield, seed production, and palatability. Seed of five superior strains bulked and composite increased for further testing.

*Description.*—Intermediate in type between northern and southern varieties. Approved for distribution on basis of good forage yield, palatability, and adaptation to South Dakota conditions.

*Released.*—1951, by South Dakota Agricultural Experiment Station.

*Breeder Seed.*—South Dakota Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity.

### JEANERETTE

*Source.*—Old fields, southern Lyon County, Kans.; first grown in mid-1890's on Henry Jeanerette farm and later widely grown in that part of Kansas.

*Description.*—Typical southern type of smooth brome resembling Achenbach in growth habit and forage yield.

*Released.*—Not officially named, but widely grown in area south of Emporia, Kans., under local name "Jeanerette" after original grower in that area.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Some commercial production.)

### KUHL

Selected at Prairie City, Oreg.

*Source.*—Field collection made on Phillip Kuhl farm near Prairie City in about 1936. (Probably an escape from observation nursery seeded on Kuhl farm in about 1930.)

*Method of Breeding.*—Increase of above field collection.

*Description.*—Low-growing type, deep rooted, dark leaves, dark heads, almost black seeds. Seems to be somewhat better adapted to drier lands than other varieties tested. Relatively low forage and seed yielder.

*Released.*—No. Entered in grass-testing program at few experiment stations in about 1938. After several years' testing was dropped and apparently now nonexistent.

*Breeder Seed.*—Discontinued.

### LANCASTER (Reg. No. 4)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

*Source.*—Clones collected from old fields in Nebraska.

*Method of Breeding.*—Produced in 1943 by field hybridization of clones from five unrelated sources. Selection of clones based on previous evaluation of their sibbed and open-pollinated progenies, studies beginning with selections from old fields in 1937.

*Description.*—Leading smooth brome variety in forage and seed yields in tests at Lincoln, 1947-52. Showed immediate promise among several experi-

mental synthetic varieties in early comparative tests at Nebraska Agricultural Experiment Station. On fertile soils is leafy, vigorous, with fine stems and somewhat drooping panicles. Seed of advanced generation first distributed as Nebraska 44 for testing.

*Released.*—1950, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### LINCOLN (Reg. No. 5)

Increased at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell and A. L. Frolik.

*Source.*—Old fields of smooth brome derived from early introductions of smooth brome prior to 1898; attributed to Hungarian origin (California introduction of 1884).

*Method of Breeding.*—Plot tests of farmer strains of smooth brome conducted in 1939-42; showed comparative superiority of locally grown southern strains as compared with strains of northern origin. Fields that showed superiority and that were traced to common origin first approved in 1941 for seed increase and later certified as Lincoln.

*Description.*—Cool-season grass; provides abundance of early-spring pasturage and fall regrowth under favorable conditions. Rhizomatous, sod-forming type. Well adapted for conservation purposes in central latitudes as compared with less aggressive northern types. Exhibits good seedling vigor and relative ease of establishment on critical planting sites.

*Released.*—1942, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### LISO

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Høglund.

*Source.*—Received in 1936 from A. E. Aldous, Kansas Agricultural Experiment Station, Manhattan.

*Method of Breeding.*—Mass selection for three generations.

*Description.*—Superior or equal in performance to other southern type varieties. Vigorous under irrigation on high-fertility land. Performance erratic in field plantings. Best results obtained in southern California on variety of soils and variable grazing management. In central and northern

California acceptable performance only on best sites and with careful management. Seed yields good and forage quality high.

*Released.*—No. Distributed for field-scale plantings in California.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

#### LYON (Reg. No. 6)

Selected at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—L. C. Newell.

*Source.*—Developed from selections made in farm strains of certified Lincoln smooth brome. Later progenies became outcrossed in selection nursery to broad source of germ plasm of southern type of smooth brome.

*Method of Breeding.*—Single clones of Lincoln smooth brome selected for seed quality and forage type and isolated; crossed seed composited and tested as B-9. Seed from progenies of these selections later outcrossed to large number of open-pollinated lines of southern type, bulked, and retested as Nebraska 36.

*Description.*—Maintains broad adaptation of Lincoln smooth brome parental stock combined with superior seed quality, seedling vigor, and more uniformly desirable plant type. Produced larger yields of forage and seed in Nebraska tests than Lincoln. As Nebraska 36, and later as Lyon, has been tested widely since 1947, showing promise over broad range of conditions. Named after Professor T. L. Lyon, who first worked with smooth brome at Nebraska Agricultural Experiment Station in 1897.

*Released.*—1950, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

#### MANCHAR (Reg. No. 10)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman, A. G. Law, A. L. Hafenrichter, and D. C. Tingey.

*Source.*—Original introduction in 1935 from Kungchuling Experiment Station of South Manchurian Railway, Manchuria, China, as P.I. 109812.

*Method of Breeding.*—Grown in nurseries at SCS Plant Materials Centers since 1935; subjected to mass selection and tested in uniform nurseries and strain tests since 1937 as P-177.

*Description.*—Intermediate between weakly spreading northern types and aggressive sod-forming southern types. Maintains good balance with associated legumes; produces vigorous seed-

ling; good yields of seed and forage; recovers rapidly after cutting. Its dark, purple-cast seeds thresh easily; seed generally heavier than that of common smooth brome.

*Released.*—1943, as P-177, cooperatively by Idaho and Washington Agricultural Experiment Stations at Moscow and Pullman, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman. Named Manchar in 1946.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

#### MANDAN 404

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—From local field collection of northern material.

*Method of Breeding.*—Developed by selection within single-plant progeny after two generations of single-plant selection under open pollination. Both inbred and open-pollination progeny tests made of each of eight clones going into variety.

*Description.*—Short, fine, very high in quality, light green. Not aggressive and not high yielder, but higher in protein at Mandan at all stages of growth than Lincoln. Tests at Mandan show Mandan 404 to be higher in palatability than Lincoln.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

#### MARTIN (Reg. No. 2)

Selected at Minnesota Agricultural Experiment Station, St. Paul.

*Source.*—Seed obtained from old fields of smooth brome in Martin County, Minn.

*Method of Breeding.*—Eighty-eight plants selected from space-planted nursery, which had been studied over 2-year period. Selections cloned; on basis of yield, leafiness, and freedom from leaf spot, 21 clones allowed to reproduce by natural cross-pollination.

*Description.*—Somewhat intermediate in growth between southern and northern strains. Generally classed as northern strain. Produced higher forage yields than Canadian common smooth brome in Minnesota.

*Released.*—Minnesota Agricultural Experiment Station.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Was recommended and certified in Minnesota for several years, but has been discontinued.)

### MINNESOTA SYNTHETICS

Selected at Minnesota Agricultural Experiment Station, St. Paul—A. R. Schmid, H. K. Hayes, and H. L. Thomas.

*Source.*—Commercial strains and collection from Martin County, Minn.

*Method of Breeding.*—Individual plants and clones studied during 1936-45. In 1945, 50 best appearing selections included in polycross nursery. These clones and their polycross progeny studied for yield, vigor, resistance to leaf spot, and maturity.

*Description.*—Six experimental synthetics developed: (1) Four most vigorous clones, (2) eight clones low in leaf spot and most vigorous in low leaf spot group, (3) eight clones selected for lateness and most vigorous in late group, (4) increase of clone 38, (5) increase of clone 17, (6) eight clones selected for extreme lateness at expense of other characteristics.

*Released.*—No. Some synthetics included in regional testing program.

*Breeder Seed.*—Not available.

### NEW YORK SYNTHETIC L

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy.

*Source.*—Wide collection of seed lots from plant breeders in United States. Parental clones: N.Y. 46-19, N.Y. 46-92, N.Y. 46-157, N.Y. 46-166, N.Y. 47-7, N.Y. 47-217, N.Y. 48E-1, N.Y. 48E-7, N.Y. 48E-11, N.Y. 48E-15, N.Y. 48E-22, N.Y. 48F-2, N.Y. 48-176, Pasture Laboratory N.Y. 47PL-23 (I-23), N.Y. 47PL-45 (III-6), N.Y. 47PL-85 (III-46), N.Y. 47PL-92 (IV-2), N.Y. 47PL-115 (IV-25).

*Method of Breeding.*—Synthetic variety developed from 18 selected, relatively self-incompatible clones. Five of clones originated at U.S. Regional Pasture Research Laboratory, ARS, University Park, Pa. First- and second-generation seed produced as for Saratoga.

*Description.*—Similar to Saratoga, but not quite so high in aftermath production.

*Released.*—No.

### OKLAHOMA (CHAPEL HILL)

Selected at SCS Nursery, Chapel Hill, N.C.—Paul Tabor and L. R. Roof.

*Source.*—Strains BN (Beltsville Nursery) 4415, 4416, 4417 (from Oklahoma), and SC 20-905 (collection made by Paul Tabor near Roanoke, Va.).

*Method of Breeding.*—Selection of most vigorous, disease-resistant plants from Oklahoma strains and transplanting these with Roanoke strain in isolated block.

*Description.*—Vigorous, more southern strain than other smooth brome varieties.

*Released.*—No. Seed distributed by SCS Nursery, Chapel Hill, in 1949.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Seed available in western Kentucky under name "Chapel Hill brome.")

### OKLAHOMA 1

Selected at Oklahoma Agricultural Experiment Station, Stillwater. (See Southland.)

*Source.*—Selection made in 1942 from old field of smooth brome (Kansas origin) established in 1936.

*Method of Breeding.*—Selection grown in smooth brome nurseries from 1942 to 1948, inclusive.

*Description.*—Tall, vigorous, late, leafy. Medium-heavy seed producer. Moderately free of disease.

*Released.*—No. Included in regional testing program. Discontinued in favor of Southland.

*Breeder Seed.*—Discontinued.

### PARKLAND

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan.

*Source.*—Increased progeny of third-generation inbred line descending from single plant selected in 1923 along roadway near Saskatoon.

*Description.*—Rhizomes present, but spread restricted to about 60 percent of that of Canadian common smooth brome. Considerably more sterile culms and lower seed yields (40-50 percent) than Canadian common smooth brome.

*Released.*—Canada Department of Agriculture.

*Breeder Seed.*—No longer available in original form. Type maintained in experimental synthetics S-5054, S-5563, and S-6400 at Canada Agriculture Research Station, Saskatoon.

*Certified Seed.*—Not available.

### REDPATCH

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—W. R. Childers.

*Source.*—Clones selected from seven standard varieties; seven clonal lines received from R. C. Murphy, Cornell University, Ithaca, N.Y.; seven experimental strains developed by R. P. Knowles, Saskatoon, Saskatchewan, Canada.

*Method of Breeding.*—Selections made over 4-year period from space-planted nursery; 142 open-pollinated lines evaluated in replicated test; 2-year average yields used to select highest yielding 21 clones; clones established in isolated polycross block and progeny tested. Synthetic 1 seed distributed for yield tests under designation "Ottawa Synthetic C."



*Description.*—Heads 3–4 days earlier than Saratoga, but otherwise similar in general characteristics. Selected for leafiness, aftermath recovery, and disease resistance. At some locations aftermath recovery is greater and at others less than Saratoga. Southern type smooth brome; produced good yields in eastern Canada.

*Released.*—1963, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available in limited quantity in 1964.

#### SAC (Reg. No. 12)

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—E. L. Nielsen, D. C. Smith, and P. N. Drolsom.

*Method of Breeding.*—First-cycle selections polycrossed were S<sub>1</sub> and S<sub>2</sub> plants from older varieties and strains. Polycross tested as spaced plants and as synthetic. Second-cycle polycross and synthetic based on 81 clones selected for foliage disease reaction, vigor, leafiness, and seed production. Distributed for testing as B-81.

*Description.*—Growth characteristics similar to those of southern adapted strains; seed quality similar to that of northern adapted strains. Good tolerance to foliage diseases and *Helminthosporium* and *Pythium* root rot diseases. Moderately coarse. Seed production adequate.

*Released.*—1962, cooperatively by Wisconsin Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Wisconsin Agricultural Experiment Station.

*Certified Seed.*—Available. (Produced through cooperation of Oregon and Washington State certification agencies and originating agencies.)

#### SANDBURG

Selected in 1925–33 by Douglas Lytle, Montrose, Colo., from ordinary or Canadian common smooth brome.

*Source.*—Clarence Sandburg, Montrose, successor to Douglas Lytle.

*Method of Breeding.*—Selection of more robust plants, blending, and increasing in bulk.

*Description.*—Similar to Lincoln, but slightly earlier.

*Released.*—Seed sold by Lytle & Sandburg and tested by Colorado Agricultural Experiment Station, Fort Collins.

*Breeder Seed.*—Not available.

*Certified Seed.*—Very little, if any, now available.

#### SARATOGA (Reg. No. 8)

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy and S. S. Atwood.

*Source.*—Wide collection of seed lots from plant breeders in United States. Parental clones: N.Y. 46–11, N.Y. 46–19, N.Y. 46–92, N.Y. 46–157, N.Y. 46–166.

*Method of Breeding.*—Synthetic variety developed from five selected, relatively self-incompatible clones. Breeder seed produced in isolated plot from randomly planted vegetative pieces of five clones in 100 or more replications. Equal amounts of seed from each parental clone mixed together for breeder seed. Foundation seed first advanced generation from breeder seed. Certified seed first advanced generation from foundation seed and not eligible for use as planting stock for production of any class of certified seed.

*Description.*—Vigorous, high seedling vigor, early-spring growth; quick recovery and high aftermath production following cutting. Yielded 8 percent more in total season yield and 29 percent more in aftermath yield than Lincoln when grown alone; yielded same as Lincoln when grown in mixture with alfalfa, but higher proportion of mixture has been grass. Similar to Lincoln in yield and quality of seed and in resistance to brown spot and scald, but superior to Canadian common smooth brome and Manchard.

*Released.*—1955, by New York Agricultural Experiment Station.

*Breeder Seed.*—New York Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

#### SOUTHLAND (Reg. No. 9)

Selected at Oklahoma Agricultural Experiment Station, Stillwater—W. B. Gernert, Hi W. Staten, M. D. Jones, W. C. Elder, and R. A. Chessmore.

*Source.*—Small field of smooth brome (seed of Kansas origin) seeded on Agronomy Farm in 1936. Selections made from this field, and other selections obtained from additional introductions. Original source of seed of selections rather obscure.

*Method of Breeding.*—Five open-pollinated lines selected as showing superior characteristics and performance bulked for testing as Oklahoma Synthetic.

*Description.*—Differences that generally separate southern from northern types of smooth brome accentuated in Southland. Rather coarse, broad leaved, heavy stemmed. Individual plants average somewhat taller and somewhat later in maturity than average of other southern types. Somewhat greater resistance to leaf diseases than most standard southern strains, but its chief advantage in significantly greater yielding capacity, greater seedling vigor, and generally better adaptation to southern conditions.

*Released.*—1953, by Oklahoma Agricultural Experiment Station.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

*Certified Seed.*—Available.

#### WISCONSIN B-55

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—D. C. Smith and E. L. Nielsen.

*Method of Breeding.*—Synthetic made up of 88 plants, following one or more generations of inbreeding and selection. Parental clones vigorous, strongly creeping, dark green, moderately tall, of medium leafiness.

*Description.*—Approaches southern-adapted strains in general morphological characteristics, equals southern strains in yield in Wisconsin, and appears to possess greater disease resistance than other named strains.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

#### WISCONSIN B-63

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—D. C. Smith and E. L. Nielsen.

*Method of Breeding.*—Synthetic based on 44 plants selected following one or more generations of inbreeding and selection. Selected plants tall, of medium earliness and texture. Leafiness and creeping habit intermediate; foliage medium to early in maturity.

*Description.*—Yielding capacity about same as that of other varieties in Wisconsin, but disease reaction somewhat better than that of commercially available strains.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### *Bromus marginatus* Nees, mountain brome

Cool-season, native bunchgrass closely related to *Bromus carinatus*; similar to it in soil and climatic adaptation. Short lived; but large seed and good seedling vigor. Deep, well-branched root system important in providing protection on erodible slopes.

#### BROMAR (Reg. No. 1)

Selected at Plant Materials Center, SCS, Pullman, Wash.—A. L. Hafenrichter, A. G. Law, and J. L. Schwendiman.

*Source.*—Native collection made at Pullman in 1933 and assigned accession number WN-439. Selection P-3368 from this accession used in developing Bromar.

*Method of Breeding.*—Mass selection with screening for head smut resistance. Bromar was one of four ecotypes among 69 accessions of mountain brome tested.

*Description.*—Rapid-developing, late-maturing, perennial bunchgrass. Tall, erect, vigorous, with medium-coarse stems and abundant, broad, well-distributed leaves. When compared with commercial strain, Bromar is taller, leafier, highly resistant to head smut, 2 weeks later in maturity; has more seeding vigor; is earlier in spring recovery. Heavy seed and forage producer; compatible in rate of growth with sweetclover; seed readily deawned. Outstanding in performance in mixtures with sweetclover or red clover for pasture or green manure in short rotations.

*Released.*—1946, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively; Plant Materials Center, SCS, Pullman; and Crops Research Division, ARS. Seed distributed for testing in 1940 as P-3368.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Not available.

### *Bromus mollis* L., soft chess

Cool-season, annual bunchgrass from Europe. Widely distributed, weedy grass. Important forage species in annual ranges of California.

#### BLANDO (Reg. No. 11)

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

*Source.*—Collected May 21, 1940, from winter-

annual rangeland near San Ramon, Calif., by D. J. Vanderwal.

*Method of Breeding.*—Tested in comparison with 27 other collections of *Bromus mollis* by Pleasanton Plant Materials Center and San Fernando Nursery, SCS, Calif., since fall of 1940 as P-11657.

*Description.*—Winter-growing, heavy root-producing, self-seeding annual grass for range and

brush-burn seeding and for conversion of abandoned grainland to range. Primary advantage over other strains is its consistent forage and seed production from year to year. During unfavorable years demonstrated its superiority by outperforming all other strains. Although well adapted to low-fertility sites, responds exceptionally well to applications of fertilizer. In relation

to other strains tested, is intermediate in time of maturity and suberect in growth habit.

*Released.*—Cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

*Certified Seed.*—Available.

### ***Bromus tectorum* L., cheatgrass**

Cool-season, winter-annual bunchgrass from Europe. Aggressive, weedy, covering extensive areas in West, and widely distributed in United States. Produces good forage when young, but yields fluctuate widely and quality declines rap-

idly with maturity. Awns cause mechanical injury to stock; mature forage constitutes serious fire hazard throughout West. No attempts made to improve this species.

### ***Bromus tomentellus* Boiss.**

Cool-season bunchgrass from Asia Minor and U.S.S.R. Tested for erosion control, but little used at present.

#### **P-2447**

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—P.I. 111530, from Institute of Plant Industry, Leningrad, U.S.S.R., by Westover-Enlow expedition in 1934.

*Method of Breeding.*—Developed by mass selection through several generations.

*Description.*—Rapid-developing, early-maturing, short-lived brome; perennial, bunch type.

Leaves dark green, lightly pubescent, abundant, mostly basal, and very low in lignin content. Seed culms few; seed production relatively low after first season; seeds short awned. Outstanding spring recovery and rapid recovery after cutting. Seedling vigor strong; strong root system developed. Leaves remain green long after seed matures. Appears to be best adapted to conservation seedings on medium-textured soils at elevations above 2,000 feet where effective moisture is over 18 inches annually.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

### ***Buchloë dactyloides* (Nutt.) Engelm., buffalograss**

Warm-season, sod-forming, native grass. Spreads by stolons. Occurs mainly in short-grass associations in Great Plains. Drought resistant; often indicative of overgrazing; adapted to grazing and erosion control on heavy soils.

#### **MESA**

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan.

*Source.*—Female plant (1-2022) obtained from Wildorado, Tex., by M. L. Peterson in 1940. Male plant (2×2232-3) selected in 1944 from progeny of cross 35-17-c (from Hays, Kans.) × 0-1 (from Chillicothe, Tex.).

*Method of Breeding.*—Selection for superior combining ability.

*Description.*—F<sub>1</sub> progeny of cross between clones 1-2022 and 2×2232-3. Seed fields must be established from sod. F<sub>1</sub> variable, but as population is vigorous, spreads rapidly and has apparently high yield of forage. Female and male parents will be planted in seed-production fields at ratio of 4 to 1. Female parent vigorous and characterized by exceptional height of bur and outstanding shatter resistance.

*Released.*—Cooperatively by Oklahoma Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Oklahoma Agricultural Experiment Station.

*Certified Seed.*—Available.

### *Chloris gayana* Kunth, rhodesgrass

Warm-season, sod-forming grass introduced from Africa in 1902. Used for pasture and hay in southern Texas, to limited extent elsewhere along gulf coast to Florida, and under irrigation in southern Arizona and California. Although valuable forage species that tolerates saline or alkali

line conditions, distribution and use restricted by lack of winter hardiness and susceptibility to rhodesgrass scale (*Antonina graminis* (Mask.)). No varieties available, but selection for scale-resistant varieties progressing with considerable success at Substation 15, Weslaco, Tex.

### *Cynodon* spp., bermudagrasses

*Cynodon dactylon* (L.) Pers. (bermudagrass) is major warm-season, sod-forming grass introduced from Africa in 1751 or earlier. Used for pasture, hay, lawns, general-purpose turf, and erosion control. Best adapted to relatively fertile soils in humid Southern States, but found as far north as Maryland and southern part of central Corn Belt States. Giant bermudagrass found in irrigated areas in Southwestern United States appears to be diploid form of *C. dactylon*. Distinguished from common bermudagrass by greater vigor and lack of pubescence. *C. plectostachyus* (K. Schum.) Pilg. (stargrass) is warm-season, stoloniferous grass from Africa. Robust, pubescent, and non-hardy. Used to limited extent in southern Texas and Southwestern United States. Several other species introduced for turf purposes, including *C. transvaalensis* Burt-Davy (transvaalensis or floridagrass), *C. magennisii* Hurcombe (magenis), and *C. bradleyi* Stent (bradley). Interspecific hybridization, as noted in following descriptions, has been important factor in development of improved varieties.

#### BAYSHORE (GENE TIFT)

Selected from Bayshore Golf Club, Miami Beach, Fla.

*Source*.—Selected vegetatively from Bayshore Golf Club, Miami Beach, by Roy A. Bair in 1945, and placed in evaluation nursery at Everglades Experiment Station, Belle Glade, Fla., as Bayshore. At about same time name "Gene Tift" suggested for this grass in tribute to man of same name who propagated considerable quantities for distribution to golf courses in area. This synonymy continued among golf circles. This selection among group transferred to Florida Agricultural Experiment Station, Gainesville, when present turf research program initiated in 1952. Under new program established for further evaluation and classification as FB 3.

*Method of Breeding*.—Reported to be by natural crossing of native Florida turf-type bermudagrass selections with selections of *Cynodon* species from Union of South Africa supplied by John Monteith, Jr., then director of U.S. Golf Association Green Section. Plots of various introductions planted

vegetatively among native selections in test nursery at Bayshore Golf Club just prior to World War II by Fred Hurger, then superintendent of golf course. Golf course closed during war and grasses grew unattended. Golf course reopened after war and number of plant types visible. This particular selection one of several collected by Roy A. Bair for testing and evaluation. Selection maintained vegetatively, producing no appreciable quantity of viable seed. Records on African introductions not available, but it is believed to have been African bermudagrass (*Cynodon transvaalensis* Davy).

*Description*.—Light-green, fine-textured, putting-green type of bermudagrass. Seems more adapted to southern than to northern Florida. More upright in growth, produces more clippings, yet inferior in turf quality to Everglades 1 in tests at Gainesville. Still marked improvement in putting-green quality over common bermudagrass. Shows distinct resistance to certain leaf spot diseases compared with common bermudagrass.

*Released*.—Not officially, although has been distributed in golf-turf industry.

*Breeder Stock*.—Not available.

#### COASTAL (Reg. No. 1)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source*.—F<sub>1</sub> hybrid between Tift bermudagrass (discovered by J. L. Stephens in old cotton patch near Tifton in 1929) and tall-growing introduction from Union of South Africa.

*Method of Breeding*.—Parents interplanted to allow for maximum natural crossing. Over 5,000 seedling plants carefully screened for many traits. Few of best clones subjected to numerous replicated tests giving measures of their palatability, efficiency, yield potential, management requirements, production under grazing, etc. Tested as selection 35.

*Description*.—When compared with common bermudagrass, Coastal has larger and longer stems, stolons, and rhizomes; grows much taller; is lighter green; has deeper and more efficient root system; is more resistant to foliage diseases, root

knot nematode, frost, and drought; is much more efficient in nutrient and water use; is more palatable and produces nearly twice as much forage and animal products. This superiority holds throughout most of Bermudagrass Belt, demonstrating wide adaptation. Produces few seed heads that rarely contain viable seed; must be propagated vegetatively.

*Released.*—1943, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

### EVERGLADES

Selected at Everglades Experiment Station, Belle Glade, Fla.

*Source.*—Vegetative collection from Bayshore Golf Club, Miami Beach, by Roy A. Bair in 1945; placed in evaluation nursery at Everglades Experiment Station as Everglades 1. Turf work at this station discontinued in 1950; plant material transferred to Florida Agricultural Experiment Station, Gainesville, in 1952. This selection entered in testing program as FB-4.

*Method of Breeding.*—Reported to be natural cross between native Florida turf-type bermudagrass selections with selections of *Cynodon* species from Union of South Africa supplied by John Monteith, Jr., then director of U.S. Golf Association Green Section. Plots of various introductions planted vegetatively among native selections in test nursery at Bayshore Golf Club just prior to World War II by Fred Hurger, then superintendent of golf course. Golf course closed during war and grasses grew unattended. Golf course reopened after war and number of plant types visible. This particular selection one of several collected by Roy A. Bair for testing and evaluation. Selection maintained vegetatively, producing no appreciable quantity of viable seed. Records on African introductions not available, but believed to have been *C. transvaalensis*.

*Description.*—Medium-green, uniform, fine-textured bermudagrass of good quality; close-growing, vigorous, putting-green type. Appears best adapted to southern Florida. Much superior in turf quality to common bermudagrass and resistant to certain leaf spot diseases associated with common type.

*Released.*—1962, Florida Agricultural Experiment Station.

*Breeder Stock.*—Florida Agricultural Experiment Station.

*Certified Stock.*—Available.

### GREENFIELD

Selected at Oklahoma Agricultural Experiment Station, Stillwater.

*Source.*—Selected from among large number of common strains collected from all parts of Oklahoma. This particular selection found on station farm.

*Description.*—Intermediate between coarse and very fine types of common bermudagrass. Exposed stolons purple; rhizomes short, crooked, numerous, forming dense mat. Winter hardy. Requires fertile soil especially high in nitrogen, but one of chief advantages is its ability to grow on less fertile soils. Propagated vegetatively.

*Released.*—1954, by Oklahoma Agricultural Experiment Station.

*Breeder Stock.*—Oklahoma Agricultural Experiment Station.

*Certified Stock.*—Available.

### MIDLAND (Reg. No. 2)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—F<sub>1</sub> hybrid between cold-resistant common bermudagrass from Indiana, supplied by G. O. Mott, and Coastal bermudagrass.

*Method of Breeding.*—In 1942 enough seed of cross—Indiana bermudagrass × Coastal bermudagrass—made to give 66 F<sub>1</sub> hybrids evaluated for many characteristics beginning in 1943. Selection 13 most productive, more cold resistant than Coastal, surviving two winters at Lafayette, Ind., where Coastal bermudagrass winterkilled.

*Description.*—Taller, larger, leafier, more disease resistant, producing more open sod than common bermudagrass. Superior to common bermudagrass in most of good traits that characterize Coastal. Midland (selection 13) less productive than Coastal where latter does not suffer stand loss because of winter injury. Darker green, tends to produce more heads, starts growth earlier in spring than Coastal. Superiority over Coastal in tests at Stillwater, Okla., led to its release in that State. Recommended for northern part of Bermudagrass Belt.

*Released.*—1953, cooperatively by Oklahoma Agricultural Experiment Station, Stillwater; Georgia Coastal Plain Experiment Station; and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station. Foundation stock maintained at Oklahoma Agricultural Experiment Station.

*Certified Stock.*—Available in quantity.

### NK-37

Selected at Phoenix, Ariz., by Northrup, King & Co.—Dale Grissom.

*Source.*—Seed harvested in about 1938 from giant strain observed growing on island in Colorado River near Yuma, Ariz. This seed collection increased and tested in Hawaii, where it performed very satisfactorily. Seed produced for several years, but production eventually discontinued.

*Method of Breeding.*—Superior plants selected from old, established production field were moved to clonal nursery at Phoenix. Plants selected on basis of superior growth habit, vigor, disease resistance, and seed productiveness. Bulk seed from selected plants identified as NK-37 bermudagrass.

*Description.*—Tall, giant strain; double size of common bermudagrass in Yuma area.

*Released.*—Seed distributed for testing in 1957 and 1958.

*Breeder Seed.*—Northrup, King & Co.

*Certified Seed.*—Not available. (Limited amount available commercially.)

### ORMOND

Selected from Ellinor Village Country Club, Ormond Beach, Fla.

*Source.*—Selected vegetatively by Roy A. Bair in about 1946 from long-established fairway showing superior turf performance at Ellinor Village Country Club. When entered in testing nursery at Everglades Experiment Station, Belle Glade, Fla., selection designated as Ormond. In 1952 when turf program transferred to main station at Gainesville, Fla., selection entered in comprehensive testing nursery as FB 25.

*Method of Breeding.*—As far as can be determined, appears to have been natural selection. Quite possibly it developed from natural crossing of native and Arizona common bermudagrasses during World War II when golf course was inactive and unattended. As with most golf courses, maintenance records not complete enough to show practices that might shed further light on history of this selection.

*Description.*—Attractive blue green, vigorous, competitive, well adapted throughout Florida. Medium texture, making it suitable for golf tees and fairways as well as recreational areas. Grows uniformly, somewhat more prostrate in habit than Tiflawn, less tendency to produce thatch. Much superior to common bermudagrass in turf performance. Resistant to certain leaf spot diseases associated with common bermudagrass, but marked susceptibility to dollar spot disease.

*Released.*—1962, by Florida Agricultural Experiment Station, Gainesville.

*Breeder Stock.*—Florida Agricultural Experiment Station.

*Certified Stock.*—Available in limited quantity. (Available commercially.)

### ROYAL CAPE

Increased at Southwestern Irrigation Field Station, Brawley, Calif.—H. P. Ford and K. R. Stockinger.

*Source.*—Original planting stock obtained by J. L. Stephens at Frankenswald Experiment Station, Johannesburg, Union of South Africa, March 3, 1955. Represents direct increase of Royal Cape selected by C. M. Murray on Royal Cape Golf Course near Mowbray, Cape Province, Union of South Africa, in 1930. Introduced as P.I. 224147. Previous collection of Royal Cape, identified as P.I. 213387, received from Union of South Africa in February 1954.

*Method of Breeding.*—Compared with named varieties and other introductions in salt basins and under mowing.

*Description.*—Dark-green, fine-leaved variety. Forms dense, wear-resistant sod and tolerates high salt concentrations. In Imperial Valley, Calif., it remains green well into winter and starts growth very early in spring. Produces few, if any, seed heads in spring and none during remainder of year. Disease has not been problem in Imperial Valley, but variety is susceptible to some leaf diseases in humid Southeastern United States.

*Released.*—1960, cooperatively by University of California, Los Angeles, and Crops Research Division, ARS.

*Breeder Stock.*—Southwestern Irrigation Field Station.

*Certified Stock.*—Not available. (Available commercially.)

### SUNTURF

Increased at several experiment stations in Southeastern United States.

*Source.*—P.I. 184339, *Cynodon magennisii* Hurcombe. Stolons presented by Mildred Wilman, Kimberley, Union of South Africa, in 1949.

*Description.*—Perennial, fine leaved, dark green. Low-growth habit, creeping stolons, spreads rapidly. Drought resistant, not shade tolerant. Produces few seed heads—so far no seed found. Sometimes has rust.

*Released.*—1956, cooperatively by Alabama, Arkansas, Oklahoma, and South Carolina Agricultural Experiment Stations at Auburn, Fayetteville, Stillwater, and Clemson, respectively.

*Breeder Stock.*—Alabama, Arkansas, Oklahoma, and South Carolina Agricultural Experiment Stations.

*Certified Stock.*—Available.

### SUWANNEE (Reg. No. 6)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—F<sub>1</sub> hybrid between Tift bermudagrass (discovered by J. L. Stephens in old cotton patch near Tifton in 1929) and tall-growing introduction from Union of South Africa.

*Method of Breeding.*—Parents interplanted to allow for maximum natural crossing. Over 5,000 seedling plants carefully screened for many traits. Few of best clones subjected to numerous replicated tests giving measures of their palatability, efficiency, yield potential, management requirements, production under grazing, etc. Tested as selection 99.

*Description.*—Similar to Coastal, except more erect, makes more open sod, less weed resistant, less tolerant of close grazing, but more drought resistant and definitely superior in productivity and efficiency of nutrient and water use on deep sands. Released for use on several million acres of these soils in South.

*Released.*—1953, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

#### TEXTURF 1F

Selected at Texas Agricultural Experiment Station, College Station—J. R. Watson and E. C. Holt.

*Source.*—Golf course in Dallas-Fort Worth, Tex., area. Tested as T-35A.

*Method of Breeding.*—Vegetative increase of original collection.

*Description.*—Fine-textured light-green grass. Produces dense ground cover that tends to be free of weeds; relatively free of unsightly seed stems. Makes good spring recovery. Susceptible to leaf diseases; for this reason plantings in gulf coast and eastern Texas areas not recommended. Since it lacks extensive root system, more susceptible to drought than common bermudagrass.

*Released.*—1957, by Texas Agricultural Experiment Station.

*Breeder Stock.*—Texas Agricultural Experiment Station.

*Certified Stock.*—Available.

#### TEXTURF 10

Selected at Texas Agricultural Experiment Station, College Station—J. R. Watson and E. C. Holt.

*Source.*—Corsicana Country Club, Corsicana, Tex. Tested as T-47.

*Method of Breeding.*—Vegetative increase of original collection.

*Description.*—Medium textured, dark green. Produces dense turf; relatively free of seed stems. Makes early-spring recovery and tends toward

closer and shorter growth than common bermudagrass. Better leaf-disease resistance, resulting in better color in autumn. Sensitive to chlorinated hydrocarbon insecticides, turning straw color following application of these materials. Recovers in 5 to 7 days with no permanent damage. Slower in producing cover than common bermudagrass.

*Released.*—1957, by Texas Agricultural Experiment Station.

*Breeder Stock.*—Texas Agricultural Experiment Station.

*Certified Stock.*—Available.

#### TIFFINE (Reg. No. 3.)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton and B. P. Robinson.

*Source.*—F<sub>1</sub> hybrid between *Cynodon dactylon* (L.) Pers. and *C. transvaalensis* from East Lakes Golf Course in Atlanta, Ga.

*Method of Breeding.*—Out of extensive crossing efforts involving Tiflawn bermudagrass (2n=36) and African bermudagrass (2n=18) came eight F<sub>1</sub> hybrids (triploids, 2n=27). Thoroughly screened under lawn and golf-green management and compared with superior selections of *C. dactylon* from golf courses. Distributed for testing as Tifton 127.

*Description.*—Lighter green, more disease resistance, and much finer texture than common bermudagrass. Superior for putting greens and fine lawns. Completely male sterile, sheds no pollen to annoy hay fever victims, and must be propagated vegetatively.

*Released.*—1953, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

#### TIFGREEN (Reg. No. 5)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton, Jim Latham, and B. P. Robinson.

*Source.*—F<sub>1</sub> hybrid between superior clone from golf green at Charlotte Country Club, Charlotte, N.C., and *Cynodon transvaalensis* from East Lakes Golf Course in Atlanta, Ga.

*Method of Breeding.*—Best of several F<sub>1</sub> hybrids (triploids, 2n=27), involving Charlotte bermudagrass (*C. dactylon*) (2n=36) and African bermudagrass (2n=18). Thoroughly evaluated in comparison with number of bermudagrasses under golf-green management. Tested as Tifton 328.

*Description.*—Darker green and produces better putting surface than Tiffine. Similar in other respects and also being used for fine lawns.

*Released.*—1956, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

#### TIFLAWN (Reg. No. 4)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—F<sub>1</sub> hybrid between two selections of bermudagrass from pasture-breeding research at Georgia Coastal Plain Experiment Station.

*Method of Breeding.*—Several hundred F<sub>1</sub> hybrids between short, dense, dwarf selection and larger disease-resistant type subjected to thorough screening, which involved finally evaluating best under lawn and golf-green management. Tested as Tifton 57.

*Description.*—When compared with common bermudagrass, Tiflawn spreads faster, makes denser weed-free turf, more disease- and frost-resistant, requires less fertilization, and tolerates more wear. Particularly well suited for heavy-duty turf and used on many university football fields in South.

*Released.*—1952, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

#### TIFWAY

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton, Jim Latham, and B. P. Robinson.

*Source.*—Chance F<sub>1</sub> hybrid between *Cynodon transvaalensis* and *C. dactylon* in lot of *C. transvaalensis* seed received from D. Meredith, Johannesburg, Union of South Africa, in 1954.

*Method of Breeding.*—Thoroughly screened under lawn and golf-green management and compared with superior selections of *C. dactylon* currently available. Tested as Tifton 419.

*Description.*—Darker green, greater frost resistance, earlier spring growth, greater sod webworm and mole cricket resistance, better herbicide tolerance, and stiffer leaf blades than Tiffine or Tifgreen. Sheds no pollen to annoy hay fever victims. Well suited for fine lawns, fairways, and tees. Must be propagated vegetatively.

*Released.*—1960, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

#### TUFCOTE

Increased at National Plant Materials Center, SCS, Beltsville, Md.—R. B. Thornton.

*Source.*—Introductions received from Union of South Africa in 1942.

*Method of Breeding.*—Single-plant survivor selected from original source nursery; only plant that survived —17° F.

*Description.*—Medium texture, medium dark green, low growth habit, and fair to good tolerance to heavy traffic. Good winter hardiness, some tolerance to leaf diseases, and remains green longer in fall than common.

*Released.*—1962, cooperatively by Maryland Agricultural Experiment Station, College Park; National Plant Materials Center, SCS, Beltsville; and Crops Research Division, ARS. Released originally as Tuffy and renamed Tufcote in May 1963.

*Breeder Stock.*—National Plant Materials Center, SCS, Beltsville.

*Certified Stock.*—Available.

#### U-3

Received at Beltsville, Md., by U.S. Golf Association Green Section, ARS cooperating—Fred V. Grau.

*Source.*—Selected in early 1930's from numerous fine strains of bermudagrass found on golf greens by D. Lester Hall, Savannah, Ga.

*Method of Breeding.*—Vegetative increase of original collection followed by comparative testing.

*Description.*—Moderately fine leaved. Cold hardy; adapted for use on lawns, fields, park areas, and golf-course tees and fairways. Rapid spreading; produces durable turf and has wide adaptation to soil and climatic conditions.

*Released.*—Distributed in 1946-47 by Crops Research Division, ARS, and U.S. Golf Association Green Section.

*Breeder Stock.*—Plant Industry Station, Beltsville.

*Certified Stock.*—Available. (U-3 bermudagrass seed offered for sale, but produces variable turf as would be expected.)

#### UGANDA

Increased by Fred V. Grau, College Park, Md., Plant Industry Station, Beltsville, Md.; and several State agricultural experiment stations.

*Source.*—P.I. 183551. Introduced through efforts of John Plant, Cairo, Egypt, and R. T. Jones, Atlanta, Ga., from Gezira Club in Cairo.



*Description.*—Fine-bladed, low-growing bermudagrass. Suitable for putting greens and tennis courts. Very fine textured, relatively slow spreading; tends to assume reddish-purple cast after first cool nights in fall.

*Released.*—Not officially. (Distributed for testing.)

*Breeder Stock.*—Fred V. Grau, College Park.

*Certified Stock.*—Not available. (Available commercially.)

### ***Dactylis glomerata* L., orchardgrass**

Cool-season bunchgrass from central and western Europe. Used for hay, pasture, and silage in Northeastern States south to northern part of Gulf Coast States and west to eastern edge of Great Plains. Valuable species in irrigated and high-rainfall areas of intermountain region and Western States. Less winter hardy than timothy and smooth brome. Major forage grass from Pennsylvania to North Carolina and west to Iowa and Missouri.

#### **AKAROA**

Increased at Plant Materials Center, SCS, Pleasanton, Calif.—A. L. Hafenrichter, W. E. Chapin, and R. L. Brown.

*Source.*—Introduced from New Zealand.

*Method of Breeding.*—Comparative tests in Washington, Oregon, and California.

*Description.*—In contrast to commercial, later maturing, finer stemmed, leafier, and shorter growing. Seed fields appear rather variable until heading. Winter hardy under irrigation in northern California and adjacent Nevada, but occasionally suffers from winter injury in other Intermountain States.

*Released.*—1953, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

*Breeder Seed.*—Plant Materials Center, SCS, Aberdeen, Idaho.

*Certified Seed.*—Available.

#### **AVON**

Selected at Macdonald College, Quebec, Canada.

*Source.*—Obtained from Sweden through Swedish Farmers' Association in 1911.

*Method of Breeding.*—Mass selection for winter hardiness.

*Description.*—Early maturing; high level of winter hardiness. Performed well in areas having severe winters.

*Released.*—Macdonald College.

*Breeder Seed.*—Macdonald College.

*Certified Seed.*—Not available.

#### **BOONE**

Selected at Kentucky Agricultural Experiment Station, Lexington—R. C. Buckner.

*Source.*—Kentucky naturalized strains.

*Method of Breeding.*—Plants selected in 1952 from surviving plants of seven naturalized strains that had been subjected to intensive clipping treatments for 3 years. Seven strains were highest yielding entries in tests, including approximately 25 naturalized strains. About 400 plants removed from plots and isolated for seed increase. Progeny performance of these plants equal or superior to best of naturalized strains in yield and agronomic performance. Increased as Kentucky 79G23-297, and distributed for regional testing as Kentucky Synthetic.

*Description.*—Superior in yield and general agronomic performance to all named varieties in Kentucky. Yields well in new stands, but particularly outstanding in yield and persistence in older sods. Some resistance to rust, but not as resistant as Potomac. About 3-5 days later in maturity than most naturalized and common orchardgrasses.

*Released.*—1961, cooperatively by Kentucky Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Kentucky Agricultural Experiment Station.

*Certified Seed.*—Limited amount available in fall of 1964.

#### **BRAGE**

Developed by Swedish Seed Association, Svalof, Sweden.

*Source.*—Single-plant selection in material from Germany.

*Description.*—Late, leafy strain. Good winter hardiness and drought resistance in Sweden.

*Released.*—Swedish Seed Association. Included in regional testing program.

*Certified Seed.*—Not available in United States.

#### **DAYTON**

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

*Source.*—Clones selected from adapted varieties and long-term stands in Iowa.

*Method of Breeding.*—Selections evaluated in clonal and progeny tests for desirable forage and seed attributes, with emphasis on rust and leaf blight resistance, winter hardiness, and yield. Six-clone synthetic under evaluation in north-central region and Pacific Northwest as R.P. 200.

*Description.*—High yielding, good recovery, and drought tolerant. Similar to Sterling in maturity, winter hardiness, and stand-establishment ability, but with improved rust and leaf blight resistance. Good seeder.

*Released.*—Distributed for testing by Rudy-Patrick Seed Co. in 1963.

*Breeder Seed.*—Rudy-Patrick Seed Co.

*Certified Seed.*—Not available. (Available commercially in 1965.)

### FRODE

Selected at Swedish Seed Association, Svalof, Sweden.

*Source.*—Collections from central Sweden in 1908.

*Method of Breeding.* One generation of mass selection within open-pollinated progeny from single superior plant in 1908 collection. Three generations of pedigree selections followed with final selection made within best family in 1942.

*Description.*—Similar in general appearance, winter hardiness, and yield to Danish orchardgrass. Approximately 5–7 days later in maturity and superior in leafiness to Danish.

*Released.*—1954, by Swedish Seed Association.

*Breeder Seed.*—Swedish Seed Association.

*Certified Seed.*—Available under OECD scheme.

### HERCULES

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Parent material of Russian origin.

*Method of Breeding.*—Line breeding originating from single-plant selection.

*Description.*—Erect, tall growing, somewhat later in maturity than common. Comparatively leafy, with marked uniformity in comparison with other types in same maturity class. Considered to be more winter hardy than most other named varieties. Where hardiness is problem, Hercules likely to be more productive than most other types. Where less hardy varieties survive, Hercules will not prove to be superior in forage production.

*Released.*—1938, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available in limited quantity.

### KENTUCKY SELECT

Selected at Kentucky Agricultural Experiment Station, Lexington—E. N. Fergus.

*Source.*—Originated on farm of Fred Stutzenberger, Louisville, Ky. Had been grown on Stutzenberger's farm for several years.

*Description.*—Highest yielding, naturalized strain in tests conducted at Kentucky Agricultural Experiment Station.

*Released.*—Recommended for use and certification by Kentucky Agricultural Experiment Station in 1931.

*Certified Seed.*—Available.

### LATAR (Reg. No. 2)

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman, R. J. Olson, and A. G. Law.

*Source.*—Original introduction from Institute of Plant Industry, Leningrad, U.S.S.R., as P.I. 111536, by Westover-Enlow expedition in 1934.

*Method of Breeding.*—Grown for three generations in nurseries at Plant Materials Center; mass selection jointly by SCS, ARS, and staff of Washington Agricultural Experiment Station, Pullman, from spaced plantings in fourth generation. Tested in uniform nurseries since 1951 as P-2453.

*Description.*—Late-maturing, hay-type orchardgrass. Blooms and matures seed on average of 10 to 14 days later than commercial varieties. Leaves abundant, broad, well distributed, and noticeably light green. Vigorous and high in vegetative production. Seed production good. Lowest among seven orchardgrass varieties in lignin content and significantly higher in digestibility.

*Released.*—1957, cooperatively by Washington and Idaho Agricultural Experiment Stations at Pullman and Moscow, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

### M2-11142

Selected at Iowa Agricultural Experiment Station, Ames, SCS cooperating—I. J. Johnson and M. E. Heath.

*Source.*—Parental clones selected from long-time stands in fields and roadways in central Iowa and south-central Minnesota in 1941.

*Method of Breeding.*—From collection of 100 clones, 10 superior in winter hardiness, disease resistance, clonal yield, and open-pollination progeny performance selected for recombination.

*Description.*—Moderately productive and winter hardy. Midearly in maturity. Fair disease resistance. Moderate seedling vigor, drought resistance, and seed yield. Recombination of clones 13, 45, 54, 58, 60, 64, 66, and 93 from Iowa and 82 and 91 from Minnesota. (See Source.)

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

**MASSHARDY**

Selected at Massachusetts Agricultural Experiment Station, Amherst—W. C. Colby and Hrant M. Yegian.

*Source.*—Obtained from commercial seedsman in Turku, Finland, in 1939.

*Method of Breeding.*—Limited inbreeding of selected plants; selection based on polycross progeny performance. Distributed for testing as Finnish Late Hay.

*Description.*—Late maturing (week to 10 days later than common orchardgrass), upright growth habit, leafy (if adequately fertilized with nitrogen), and winter hardy.

*Released.*—Massachusetts Agricultural Experiment Station.

*Breeder Seed.*—Massachusetts Agricultural Experiment Station.

*Certified Seed.*—Available. (In commercial production.)

**NAPIER**

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton.

*Source.*—Parental clones selected from adapted varieties and long-term stands in Iowa.

*Method of Breeding.*—Selections evaluated in clonal and progeny tests for desirable forage and seed attributes, with emphasis on rust and leaf blight resistance, winter hardiness, and yield. Eight-clone synthetic evaluated in north-central region as experimental strain R.P. 300.

*Description.*—Vigorous, high yielding, and good recovery. Equal to Sterling in winter hardiness, with improved rust and leaf blight resistance. Good seed production, stand establishment, and drought tolerance. Blooms 2-4 days later than Potomac and common seed lots.

*Released.*—Distributed for testing by Rudy-Patrick Seed Co. in 1963 and 1964.

*Breeder Seed.*—Rudy-Patrick Seed Co.

*Certified Seed.*—Not available. (Commercial seed available in limited quantity in 1965.)

**NEW YORK SYNTHETIC E (AURORA)**

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy.

*Source.*—Selected from large group of clones originally selected at U.S. Regional Pasture Research Laboratory, ARS, University Park, Pa., from wide collection of seed lots. Parental clones: Pasture Laboratory N.Y. 49-107 (XLI-13), N.Y. 49-127 (MXII-14 AIV-21), N.Y. 49-134 (XLII-1), and N.Y. 49-135 (XLII-4).

*Method of Breeding.*—Developed from four selected clones.

*Description.*—Very late maturing. Selected for vigor, erect growth habit, and resistance to foliar diseases. Somewhat light green in spring and fall.

Starts growth later in spring and stops growth earlier in fall than earlier maturing varieties.

*Released.*—No. To be continued under test. (Consideration given to release of this variety under name Aurora. However, because of low seed production, probably will not be released.)

*Breeder Seed.*—New York Agricultural Experiment Station.

**OREGON 233**

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

*Source.*—Increase of "selected grazing strain No. 233" obtained from Gartons, Ltd., Warrington, England, in 1936 as F.C. 22364.

*Description.*—Differs from common in having finer, denser leaf, higher forage yield, and lower seed yield. Resistant to leaf disease (*Mastigosporium rubricosum* (Dearn. & Barth.) Sprague). Shows some promise in coastal sections of Pacific Northwest.

*Released.*—Included in regional testing program for several years. Suggested for release in Oregon under name "Clatsop."

*Breeder Seed.*—John Jacob Astor Branch Experiment Station, Astoria, Ore.

**PALESTINE**

Increased at California Agricultural Experiment Station, Davis.

*Source.*—Accession number T.O. 1638 received from G. L. Stebbins in 1947. Seed received from Samaria, Palestine.

*Description.*—Under nonirrigated conditions in California, stronger winter grower than common. Drought resistant, but lacking in winter hardiness. Susceptible to rust, but not serious problem on range.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—California Agricultural Experiment Station.

**PASTURE LABORATORY SYNTHETICS,  
1 THROUGH 7**

Selected at U.S. Regional Pasture Research Laboratory, ARS, University Park, Pa.—W. M. Meyers.

*Source.*—

Synthetic 1.—Collections made in Virginia, Maryland, and Pennsylvania.

Synthetic 2.—Collections made in Pennsylvania and Maryland, and Canadian accession.

Synthetic 3.—Collections made in Vermont, and Canadian accession.

Synthetic 4.—Collections made in Pennsylvania, New York, and Maryland, also varieties Roskilde and Minerva.

Synthetic 5.—Tammisto, Tardus 2, and Skandia II.

Synthetic 6.—Tammisto, Tardus 2, and "Swedish Select grazing."

Synthetic 7.—Selected from O.P. progenies at SCS Nursery, Big Flats, N.Y. SCS accession numbers lost in fire.

*Method of Breeding.*—Selections evaluated in series of replicated polycross nurseries. Thirty-eight clones isolated on basis of clonal performance, and observational data obtained from polycross progenies.

*Description.*—Plants selected on basis of winter hardiness, disease resistance, plant type, recovery following mowing, and leafiness. Arranged in seven synthetics according to maturity.

Synthetic 1.—Seven clones: MI-13, MI-14, MI-16, MI-17, MII-30, MII-34, MII-36. Average heading date May 31.

Synthetic 2.—Five clones: MI-19, MI-20, MII-18, MII-29, MII-56. Average heading date June 1.

Synthetic 3.—Four clones: MII-45, MII-46, MII-49, MII-50. Average heading date June 3.

Synthetic 4.—Six clones: MIII-8, MIII-18, MIII-20, MIII-21, MIII-22, MIII-24. Average heading date June 6.

Synthetic 5.—Five clones: MIV-5, MIV-6, MIV-11, MIV-14, and MIV-16.

Synthetic 6.—Three clones: MIV-14, MIV-17, MIV-18. Average heading date June 10.

Synthetic 7.—Eight clones: XLI-6, XLI-8, XLI-13, XLI-17, XLI-23, XLI-24, XLII-1, XLII-4. Average heading date June 12.

*Released.*—No. Included in regional testing program. Some clones included in new synthetics developed at Pennsylvania and New York Agricultural Experiment Stations at University Park and Ithaca, respectively.

*Breeder Seed.*—Not available. Some clones available at New York and Pennsylvania Agricultural Experiment Stations.

### PENNLATE (Reg. No. 3)

Selected at Pennsylvania Agricultural Experiment Station and U.S. Regional Pasture Research Laboratory, University Park, Pa., ARS cooperating—H.R. Fortmann and H. L. Carnahan.

*Source.*—Two parents derived from Tammisto and Tardus 2, varieties bred in Finland and Sweden, respectively. Other parents selected from open-pollinated progenies of introductions grown at SCS Nursery, Big Flats, N.Y. Geographical origin of these clones cannot be traced. Clones designated MIV-5, MIV-17, XLI-8, and XLI-17.

*Method of Breeding.*—Best clones selected from three late-maturing Pasture Laboratory synthetics used to develop new four-clone synthetic. Tested

under designation Pennsylvania Late Synthetic III.

*Description.*—Late maturing, compatible in alfalfa mixtures, and competes well with associated legume. Produces higher total seasonal forage yields and higher first-cutting yields than S-37. Average heading date comparable to that of S-37, although S-37 is slightly later in many years; about 7 to 10 days later than Potomac. Comparable to common orchardgrass in winter hardiness; less susceptible to winter injury than S-37 in Pennsylvania.

*Released.*—1957, Pennsylvania Agricultural Experiment Station.

*Breeder Seed.*—Pennsylvania Agricultural Experiment Station.

*Certified Seed.*—Available.

### PENNMEAD

Selected at Pennsylvania Agricultural Experiment Station and U.S. Regional Pasture Research Laboratory, University Park, Pa., ARS cooperating—H. R. Fortmann and H. L. Carnahan.

*Source.*—Three clones originated from domestic collections made in New York, Pennsylvania, and Maryland. Fourth clone selected from Roskilde, Danish variety. Clones designated MIII-8, MIII-18, MIII-20, and MIII-24.

*Method of Breeding.*—Four-clone synthetic; developed from tests including seven Pasture Laboratory experimental synthetics and polycross progenies of component clones. Restricted polycross progenies tested in New York and Pennsylvania. Tested under designation Pennsylvania Medium Synthetic II.

*Description.*—High yielding, compatible in alfalfa mixtures, competitive, and leafy. Moderately superior in aftermath production to other currently available varieties. Recommended particularly for use in mixture with Flemish alfalfas and in other plantings where early orchardgrasses would ordinarily be used. First harvest must be cut early to insure high-quality forage. Grows late in fall; makes good recovery in spring; matures about 5 days later than Potomac.

*Released.*—1963, Pennsylvania Agricultural Experiment Station.

*Breeder Seed.*—Pennsylvania Agricultural Experiment Station.

*Certified Seed.*—Not available. (Available in limited quantity by 1967 or 1968.)

### POTOMAC (Reg. No. 1)

Selected at Plant Industry Station, Beltsville, Md.—R. E. Wagner, M. A. Hein, and P. R. Henson.

*Source.*—Plants collected in 1935 from old pastures in Maryland, Virginia, West Virginia, and

Pennsylvania and from strain tests conducted at Plant Industry Station.

*Method of Breeding.*—Collections screened on basis of type, rust resistance, leafiness, persistence, and vigor; in 1940, eight plants of predominantly pasture type placed in one isolation block (Maryland pasture strain) and six plants representing erect hay types placed in another (Maryland hay strain). In 1945 plants selected from 3-year-old broadcast plots of these two strains and established in space-planted nursery together with equal number of seedlings from each of two strains. Nursery rogued and bulk seed collected for testing as Beltsville orchardgrass. Potomac represents third cycle of mass selection from 1945 nursery.

*Description.*—Dark green, leafy, erect, similar to commercial lots in height. Productive, superior persistence, rust resistance.

*Released.*—1954, by Crops Research Division, ARS, and cooperating experiment stations.

*Breeder Seed.*—Plant Industry Station.

*Certified Seed.*—Available.

### RIDEAU

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—W. R. Childers.

*Source.*—Two clones from introductions from Estonia and Sweden and two late hardy clones of unknown origin.

*Method of Breeding.*—Clones from open-pollinated, progeny-tested plants; further evaluated in polycross nursery. Final synthetic has four clones. Original clones maintained.

*Description.*—Leafy, late, winter-hardy hay type. In late boot stage, when Vernal alfalfa in bud stage at Ottawa, makes leafy, nutritious forage. Less vigorous than early commercial types, but yield well spread out over season. Seed yields satisfactory.

*Released.*—1963, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available.

### S-37

Selected at Welsh Plant Breeding Station, Aberystwyth, Great Britain.

*Source.*—Initial plant material selected on basis of type rather than origin.

*Description.*—Hay type. Basic-type plants relatively erect and well leaved up stems, giving more leafy hay than common Danish orchardgrass. Late maturing. Performs very satisfactorily in association with legumes. Shown some evidence of lack of persistence in Eastern United States.

*Released.*—Welsh Plant Breeding Station. Included in regional testing program and recommended for use in certain States.

*Certified Seed.*—Available from Great Britain. Certified seed produced in Idaho and Washington.

### S-143

Selected at Welsh Plant Breeding Station, Aberystwyth, Great Britain.

*Source.*—Based on indigenous plant of rather extreme type, which was designated "mop" cocksfoot owing to dense, broad cushions produced by individual spaced plants.

*Method of Breeding.*—Reselected. New lots exhibit greater uniformity with respect to late maturity and prostrate growth habit.

*Description.*—Late-maturing pasture type; plants relatively spreading, with profusion of tillers and broad leaves.

*Released.*—Welsh Plant Breeding Station. Released in 1950, cooperatively by Idaho and Washington Agricultural Experiment Stations at Moscow and Pullman, respectively, and Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman.

*Certified Seed.*—Available from Great Britain. (Certified seed produced in several Western States.)

### SANDIA

Selected at former SCS Nursery, Albuquerque, N. Mex.

*Source.*—A-10655. Selected plants from "Brage" NY-NI-2569, SCS Nursery, Big Flats, N.Y.

*Method of Breeding.*—Selected more robust, disease-free plants from row planting. Plants dug and isolated for seed increase.

*Description.*—Large, robust. Grows well with alfalfa. Good seed producer and apparently rust free.

*Released.*—1953, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Plant Materials Center, SCS, Los Lunas, N. Mex.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Available in limited quantity.

### STERLING

Selected at Iowa Agricultural Experiment Station, Ames—R. R. Kalton and M. G. Weiss.

*Source.*—Clonal collections made in Iowa and southern Minnesota in 1941 and 1943.

*Method of Breeding.*—Synthetic variety developed from five selected clones (Iowa 64, 120, 121, 123, and 160, all from central Iowa). Parental clones selected for superior hardiness, forage and

seed yields, recovery, leafiness, and disease resistance based on performance of clones and inbred and outcross progenies. Seed being increased on limited generation basis. Breeder seed produced by natural pollination of five parent clones in planting isolated from other orchardgrass. Equal quantities of seed from each parent clone mixed for breeder seed. Certified seed is second advanced generation from breeder seed and not eligible for producing any class of certified seed.

*Description.*—Superior in stand establishment, winter hardiness, and forage and seed yields under Iowa conditions. Particularly outstanding in seed yield. Midearly in maturity. Moderately susceptible to rust and leaf streak. Included in regional testing program as Iowa 6.

*Released.*—1960, Iowa Agricultural Experiment Station.

*Breeder Seed.*—Iowa Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity.

### TROGDON

Selected at Missouri Agricultural Experiment Station, Columbia, ARS cooperating—E. Marion Brown.

*Source.*—Total of 344 plants selected in 1936 from sparse stand in 14-year-old field near Springfield, Mo. Also plants from bluegrass lawn in Columbia.

*Method of Breeding.*—Source material transplanted on 1-foot centers and mowed semimonthly to height of 1 inch through 1937 and 1938. Twenty-four plants selected on basis of recovery after each cutting and size and vigor at end of 2-year period of close defoliation. Selections transplanted to crossing blocks—seed composited and used to establish increase block.

*Description.*—Vigorous, persistent, not visibly distinguishable from commercial. Susceptible to leaf rust.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### UTAH SYNTHETIC

Selected at Utah Agricultural Experiment Station, Logan, ARS cooperating—W. Keller.

*Source.*—Developed from selections made in controlled competition studies at Forage Experiment Farm, Logan.

*Method of Breeding.*—Selection of 17 late-flowering plants from group of 50 chosen for high yield and good recovery from 1,400 plants grown under conditions of controlled competition. Number of clones later reduced to 14, which were planted in isolation in restricted polycross block

to produce seed. Utah Synthetic 2 simply second synthetic generation of this same material.

*Description.*—Uniformly late, dark green, with rather narrow leaves. Forage yield under irrigated conditions compares favorably with strains of similar maturity.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### WASHINGTON 88

Selected at Western Washington Experiment Station, Puyallup—M. S. Grunder.

*Method of Breeding.*—Sibs of single plant selected after three generations of self-pollination. These sibs planted under isolation, and seed produced from this mass seeding provided foundation stock for Washington 88. Strain lost during World War II; subsequently reestablished with selections from foundation field.

*Description.*—About 10 days later, less variation between individual plants, leafier than and almost as tall as common.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### WASHINGTON H-2

Selected at Western Washington Experiment Station, Puyallup—M. S. Grunder.

*Method of Breeding.*—Two relatively infertile parent plants increased vegetatively and interplanted under isolation to produce  $F_1$  seed designated as hybrid 2. Two unrelated parent plants each had background of four generations of selfing.

*Description.*—Hybrid 2 slightly shorter when fully developed. About 20 days later than common. Appears suitable for use in mixtures. Leafy; produces good yields of seed.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

### WISCONSIN F-52A

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—P. N. Drolson, D. C. Smith, and E. L. Nielsen.

*Source.*—Seed collected in 1941 from 13 colonies throughout Wisconsin.

*Method of Breeding.*—Spaced plants established in 1942 from collections. Progenies left in field for three winters and rogued for stemmy, nonleafy, and severely diseased plants; remaining plants allowed to interpollinate; product subsequently tested as Wisconsin F-52. Fifty selections made from approximately 1,000 spaced F-52

plants. Number later reduced to 24 leafy, vigorous clones with good seed habit, increased tolerance to leaf streak and stem rust (compared with F-52), and winter tolerance.

*Description.*—General growth characteristics similar to those of common. Better winter toler-

ance than common; some improvement in disease reaction.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Wisconsin Agricultural Experiment Station.

### ***Digitaria decumbens* Stent, pangolagrass**

Warm-season, sod-forming grass from Union of South Africa. Used primarily for pasture in central and southern Florida and Caribbean region. Productive, nutritious, tolerates grazing, not frost resistant. Must be propagated vegetatively. Varieties not available.

Increased at Florida Agricultural Experiment Station, Gainesville, ARS cooperating—George Ritchey.

*Source.*—P.I. 111110 vegetative planting material received from Union of South Africa in 1935.

*Method of Breeding.*—Comparative tests and pasture plots, 1941-42.

*Description.*—Similar to crabgrass (*Digitaria sanguinalis* (L.) Scop.), except perennial and vigorously stoloniferous. Susceptible to winter-killing in northern Florida.

*Released.*—1944, cooperatively by Florida Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Florida Agricultural Experiment Station.

*Certified Stock.*—Not available. (Available commercially.)

### ***Echinochloa crusgalli* var. *frumentacea* (Ronb.) W. F. Wight, Japanese millet**

Warm-season annual from India and Japan. Limited use for green feed, silage, and hay in cooler parts of Northeastern United States.

Grows better under cool conditions than sudan-grass or foxtail millet. Varieties not generally available in United States.

### ***Ehrharta calycina* Sm., perennial veldtgrass**

Cool-season bunchgrass indigenous to Union of South Africa. Used in range reseeding in California.

Increased at California Agricultural Experiment Station, Davis.

*Source.*—California accession number T.O. 1359; received from Australia in 1929.

*Description.*—Highly palatable, drought-resistant bunchgrass. Adapted to light soils; does particularly well on sandy coastal soils in California. Seed production limited by shattering, but volunteers well.

*Released.*—1947, by California Crop Improvement Association.

*Breeder Seed.*—California Agricultural Experiment Station.

*Certified Seed.*—Available.

#### **MISSION (Reg. No. 10)**

Selected at California Agricultural Experiment Station, Davis—R. M. Love.

*Source.*—Received from R. C. Rossiter, Perth, Western Australia, under accession number T.O. 1883 (P.I. 187309). Mission accession number T.O. 3051.

*Method of Breeding.*—Original panicle selections now reduced to polycross consisting of 25 clones.

*Description.*—Experimental strain differing from typical *Ehrharta calycina* in having contracted panicles and retaining larger part of seed to maturity. Little shorter than typical perennial veldtgrass, but otherwise has same range of variation in flowering date, growth habit, and fineness of foliage. Superior with respect to both seed yield and seed quality.

*Released.*—1962, cooperatively by California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton, Calif.

*Breeder Seed.*—California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton.

*Certified Seed.*—Available in 1965.

***Elymus canadensis* L., Canada wildrye**

Cool-season, native bunchgrass widely distributed in United States, especially in Great Plains, intermountain region, and Pacific Northwest. Large, coarse, short lived. Should be cut in boot stage for best quality hay. Fair palatability. Not very competitive in mixtures.

**M2-11108**

Selected at Iowa Agricultural Experiment Station, Ames, SCS cooperating—I. J. Johnson and M. E. Heath.

*Source.*—Originated as seed increase under isolation of single-plant selection made southwest of Des Moines, Iowa, in 1940.

*Method of Breeding.*—From about 100 plants selected from long-time stands in Iowa in 1940, one plant (clone 364) saved for increase purposes. All selections selfed and evaluated clonally. Clone 364 considered superior, and seed increase started in 1942. Several subsequent generations of seed increase made by SCS Nurseries at Ames and Ankeny, Iowa.

*Description.*—Uniform, leafy, vigorous. Ten or more days later in heading than Mandan wildrye.

Disease resistant; good seedling vigor. Not thoroughly tested for agronomic merit.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Elsberry, Mo.

**MANDAN**

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Field collection made near Mandan in 1935.

*Method of Breeding.*—Mass selection within two single-plant progenies and distributed as Mandan 419.

*Description.*—More and softer textured leaves, shorter culms, and longer lived than common Canada wildrye.

*Released.*—1946, cooperatively by North Dakota Agricultural Experiment Station, Fargo, and Crops Research Division, ARS.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

*Certified Seed.*—Not available.

***Elymus cinereus* Scribn. and Merr., basin wildrye**

Cool-season, slightly spreading, native grass. Distributed throughout much of Western United States; common on alkaline soils. Tall, coarse, long lived. Relatively poor in palatability and seed set.

**P-5797**

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—University of Saskatchewan, Saskatoon, Saskatchewan, Canada, in 1938.

*Method of Breeding.*—Selection of vigorous types during several generations.

*Description.*—Robust, vigorous, blue, tall growing, leafy. Broad, coarse leaves. Large stems and seed heads; good seed production; seed grows readily. Good seedling vigor. Grows well on saline soils.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

***Elymus condensatus* Presl, giant wildrye**

Cool-season, slightly spreading, native grass in Western United States, especially on saline soils. Tall, coarse. Grazed readily while young; pro-

duces fair hay when harvested early. Varieties not available.

***Elymus giganteus* Vahl, mammoth wildrye**

Cool-season, sod-forming grass from U.S.S.R. Used for inland dune stabilization in Pacific Northwest and occasionally for ornamental purposes. Drought resistant, coarse. Unpalatable; not adapted for forage.

**VOLGA (Reg. No. 9)**

Selected at Plant Materials Center, SCS, Pullman, Wash.

*Source.*—P.I. 108491. Lower Volga region,



U.S.S.R.; introduced by Westover-Enlow expedition in 1934. Propagated and tested as P-208.

*Method of Breeding.*—Selection of most vigorous plants from above introduction during several generations followed by vegetative reproduction of most desirable type.

*Description.*—Tall, coarse, green, creeping. Nonpalatable to livestock. Long lived on inland sand dunes, where it will stop sand movement and provide permanent cover. Grown from seed or propagated vegetatively. Rate of increase from

culms under proper cultural conditions 15 to 1 in first year. When established from seed, seedlings show excellent vigor.

*Released.*—Vegetative material distributed in 1949 for inland dune control by Plant Materials Center, SCS, Pullman. Seed not released.

*Breeder Seed.*—Vegetative material and seed from bulked selections, Plant Materials Centers, SCS, Aberdeen, Idaho, and Pullman.

*Certified Seed.*—Not available. (Material available for vegetative plantings.)

### *Elymus glaucus* Buckl., blue wildrye

Cool-season, native bunchgrass found from north-central region to Pacific coast. Shade tolerant, short lived. Relatively common on cut-over or burned-over land in Pacific Northwest.

#### LOMAS

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—Paul B. Dickey and O. K. Hoglund.

*Source.*—Collected from native stand in winter-annual rangeland near Sebastopol, Calif., in 1935.

*Method of Breeding.*—Green glabrous plants selected for field seeding and given SCS accession number P-10128. Selection outstanding among

129 collections of blue wildrye. Improved by mass selection for several generations and tentatively named Lomas.

*Description.*—Early-maturing, long-lived, perennial bunchgrass, with low-fertility requirement. Bright green; forms open bunch; leaves of medium width. On rangeland sites to which it is adapted, has good seedling vigor, begins growth early in fall, develops rapidly during winter, and remains green 2-4 weeks after annuals dry up. Moderate grazing essential to maintenance of stands.

*Released.*—No. Included in tests on annual range area of California.

*Breeder Seed.*—Discontinued.

### *Elymus junceus* Fisch., Russian wildrye

Cool-season bunchgrass introduced in 1927 from U.S.S.R. Used primarily for pasture over general area where crested wheatgrass is adapted. Performed well in northern Great Plains and parts of intermountain region. Starts growth early. Leafy, nutritious, with dense basal leaves. Relatively low seedling vigor, deep rooted, drought resistant, salt tolerant. Exacting conditions required for successful seed production.

#### MANDAN D-19

Increased at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Increase of P.I. 75737 received in 1927 from Western Siberian Experiment Station, Omsk, U.S.S.R. (Original recorded introduction received through H. N. Vinall.)

*Method of Breeding.*—Best among several introductions received up to 1940.

*Description.*—Typical of *Elymus junceus* introduced from U.S.S.R. Will probably be replaced by newer varieties.

*Released.*—Distributed to other experiment stations; widely grown in United States.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity. (Most often certified as commercial.)

#### SAWKI

Selected at Experimental Farm, Swift Current, Saskatoon, Saskatchewan, Canada—T. Lawrence.

*Source.*—Commercial seed of unknown origin.

*Method of Breeding.*—Synthetic of 10 clones developed after several cycles of selection and open-pollinated progeny evaluation.

*Description.*—Lacks special characteristics that distinguish it from other varieties of Russian wildrye. Superior to common in having slightly more erect growth habit, higher seed yield, and slightly higher forage yield. Limited testing under Canadian conditions suggests it is equal to or slightly superior to Vinall in seed and forage yields.

*Released.*—1963, by Canada Department of Agriculture.

*Breeder Seed.*—Experimental Farm, Swift Current.

*Certified Seed.*—Available in limited quantity by 1966 or 1967.

**VINALL (Reg. No. 5)**

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler and H. M. Schaaf.

*Source*.—Three parental clones derived from P.I. 75737 and one each from P.I. 108493 and P.I. 111549.

*Method of Breeding*.—Synthetic of five clones. At least four generations of selection on single-plant basis in open-pollinated and inbred lines preceded choice of each parent. Progeny tests in yield plots and as spaced plants used to measure effects of outcrossing with other four plants for each plant in synthetic. All five clones good seed pro-

ducers; three of them produce exceptionally large seed. Distributed for testing as Mandan 2355.

*Description*.—Forage yields equal to those of commercial. Yielded 75 percent more seed than commercial in tests conducted over 5-year period. Weight per bushel of seed and weight of 200 seeds slightly higher than weight of commercial.

*Released*.—1960, cooperatively by North Dakota (Fargo), South Dakota (Brookings), Montana (Bozeman), Wyoming (Laramie), Nebraska (Lincoln), Colorado (Fort Collins), and New Mexico (University Park) Agricultural Experiment Stations and Crops Research Division, ARS.

*Breeder Seed*.—U.S. Northern Great Plains Field Station.

*Certified Seed*.—Available in quantity.

***Eragrostis chloromelas* Steud., Boer lovegrass**

Warm-season bunchgrass introduced from Union of South Africa in 1932. Adapted to warm semidesert areas in Southwestern United States. Palatable, drought resistant, lacks cold tolerance. Longer lived than Lehmann lovegrass.

**A-84**

Increased at SCS Nursery, Tucson, Ariz.—C. G. Marshall and L. P. Hamilton.

*Source*.—Union of South Africa.

*Released*.—1950, cooperatively by Arizona Agricultural Experiment Station, Tucson, and Nursery Division, SCS.

*Breeder Seed*.—Plant Materials Center, SCS, Tucson.

*Certified Seed*.—Available in limited quantity.

**A-12752**

Selected at SCS Nurseries, Albuquerque, N. Mex., and Tucson, Ariz.—C. G. Marshall, T. F. Spaller, and L. P. Hamilton.

*Source*.—Received as *Eragrostis curvula* (Schrud.) Nees.

*Method of Breeding*.—Mass selection practiced for bluish type.

*Description*.—Vigorous strain of Boer lovegrass. Heads have more dense panicle branches than A-84; equally cold hardy.

*Released*.—Informally by SCS.

*Breeder Seed*.—Plant Materials Center, SCS, Tucson.

*Certified Seed*.—Not available. (In commercial production.)

***Eragrostis curvula* (Schrud.) Nees, weeping lovegrass**

Warm-season bunchgrass introduced from Africa in 1927. Used for erosion control and pasture in Southern United States. Well adapted in parts of southern Great Plains. Productive, not persistent under heavy grazing, drought

resistant. Grows on low-fertility soils. Palatability low except when young. No varieties available, but some strains from Union of South Africa perform well in Texas and Oklahoma.

***Eragrostis lehmanniana* Nees, Lehmann lovegrass**

Warm-season, slightly spreading grass introduced from Union of South Africa in 1932. Used for range reseeding in warm semideserts of Southwestern United States. Easily established. Prostrate stems root at nodes. Smaller and less cold tolerant than Boer and weeping lovegrass.

**A-68**

Increased at SCS Nursery, Tucson, Ariz.—C. G. Marshall.

*Source*.—Seed sent to F. J. Crider by M. Willman, Kimberley, Union of South Africa.

*Description*.—Seedlings volunteer and tolerate adverse conditions better than other lovegrasses. More drought tolerant but less cold tolerant than Boer or weeping lovegrass.

*Released*.—1950, cooperatively by Arizona Agricultural Experiment Station, Tucson, and Nursery Division, SCS.

*Breeder Seed*.—Plant Materials Center, SCS, Tucson.

*Certified Seed.*—Not available.

### COLD HARDY

Increased at SCS Nurseries, Albuquerque, N. Mex., and Tucson, Ariz.—L. P. Hamilton and T. F. Spaller.

*Source.*—A-14108 represents mixed seed of P.I. 165734 and S.P.I. 92037 produced at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla. A-14107 designated as first cold-hardy strain received from USDA. A-14108 and A-14107 bulked at Tucson.

*Description.*—Plants resemble A-68, but have denser basal leaf development. Panicle shorter and more densely branched. Less tendency for stolons. Seedlings develop less rapidly as in Boer lovegrass. Plants slightly more cold hardy than A-68; equal to Boer lovegrass. Seed yield good at Albuquerque and Snowflake, Ariz., but poor at Tucson.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Tucson.

*Certified Seed.*—Not available.

### KALAHARI

Increased at SCS Nursery, Tucson, Ariz.—L. P. Hamilton and Darwin Anderson.

*Source.*—From Kalahari Desert, Union of South Africa; introduced as P.I. 198581. Included in testing program as A-14328.

*Description.*—More productive than A-68 when moisture available; slightly taller, but no leafier

when grown under moisture stress; strains similar in other respects.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Tucson.

### PM-NM-317

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collection by J. A. Downs in 1959 from SCS field-evaluation planting on Berry Ranch near Tucumcari, N. Mex. Seed used in this particular field supplied by former SCS Nursery, Albuquerque, N. Mex., and presumed to be from initial increase of *Eragrostis* spp., P.I. 184805, and BN-6185 from Basutoland, Union of South Africa.

*Method of Breeding.*—After observing row in *Eragrostis* comparison block planted in 1960, remainder of original collection planted following year for increase.

*Description.*—Intermediate type of Lehmann lovegrass, attaining height of 30 inches. Lower growing than types represented by A-14107 and A-14328, but produces abundant stolons and herbage, as represented by A-68. Superior in cold hardiness to other strains tested at Los Lunas. Better in seedling vigor than A-14107, equaling that of A-68, and produces good seed crop first year of establishment if moisture adequate.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center SCS, Los Lunas.

### *Eragrostis trichodes* (Nutt.) Wood, sand lovegrass

Important warm-season bunchgrass. Occurs on sandy soils of central and southern Great Plains. Palatable and nutritious range grass, with deep root system and good drought resistance. Lacks persistence under heavy grazing. Starts growth in early spring and remains green until late fall.

#### A-11527

Increased at former SCS Nursery, Albuquerque, N. Mex.

*Source.*—Received originally from SCS Nursery, Woodward, Okla. Probably southern Kansas source.

*Method of Breeding.*—Bulk increase of original collection. In 1949, seed collected from early-maturing plants in field planting of A-11527 near Haxtun, Colo. This lot planted at Albuquerque and rogued for uniformity in early maturity and maintenance of high forage production. Limited increase at Los Lunas, N. Mex., of reselection, A-11527-MI-R1.

*Description.*—Original bulk production is good southern strain adapted to northeastern New Mexico and central and southeastern Colorado, but does not mature satisfactory seed crop in northeastern Colorado. A-11527-MI-R1 not tested sufficiently to determine northern limits of seed maturity.

*Released.*—1940, cooperatively by New Mexico Agricultural Experiment Station, University Park, and Plant Materials Center, SCS, Los Lunas.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Available in very limited quantity.

### NEBRASKA 27

Increased at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell and E. C. Conard.

*Source.*—Collection from native meadow in northern Holt County, Nebr.

*Method of Breeding.*—Selections moved to Lincoln in 1935 by L. C. Newell and Elver Hodges.

Seed from these plants later increased at North Platte and Waterloo, Nebr., by E. C. Conard.

*Description.*—Winter-hardy, relatively long-lived strain of sand lovegrass. In Nebraska, plantings survived and maintained stands superior to plantings made with seed from more southern sources. Well adapted to range of soil types. Application of phosphorus fertilizers to sandy soils of low fertility usually increase yields of forage and seed. Produces highly palatable, nutritious forage. Best used in mixtures with other warm-season, native grasses, such as grammas or bluestems.

*Released.*—1949, cooperatively by Nebraska Agricultural Experiment Station; Crops Research Division, ARS; and Nursery Division, SCS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available.

#### WOODWARD STRAINS

Selected at U.S. Southern Great Plains Field Station, ARS, Woodward, Okla., in cooperation with Oklahoma Agricultural Experiment Station, Stillwater—J. R. Harlan.

#### *Eremochloa ophiuroides* (Munro) Hack., centipedegrass

Warm-season, sod-forming grass from China. (Seed found in baggage of Frank N. Meyer, USDA plant explorer who disappeared on his fourth trip to China in 1916.) Well adapted to soils and climatic conditions of Southern United States; survives as far north as northern Alabama

Five lines distributed over years. W2 and W5 taken to El Reno, Okla., for more extensive testing. All these lines discontinued.

##### W1

Original field selection by Jack E. Engleman; later reselected. Tall, vigorous, large-seeded type; somewhat shatter resistant.

##### W2

Selection 45-5343. Short selection. On poor soil retains dark-green color when other strains show some chlorosis. Deeply pigmented panicles.

##### W3

Selection 45-5350. Leafy strain of medium height, open purple panicle, good seed producer.

##### W4

Selection 45-5344. Leafy, medium height, good seed producer.

##### W5

Recombines five plants from single-plant selection family (85-5088-5092, incl.). Tall, vigorous, leafy, dark green.

and Raleigh, N.C.; grows well on poor soils. Adapted for use as low-maintenance, general-purpose turf and lawn grass. Propagated vegetatively or by seed. Not desirable as pasture plant. Varieties not available.

#### *Festuca arundinacea* Schreb., tall fescue

Major cool-season bunchgrass from Europe. Used for pasture, hay, general-purpose turf, and erosion control throughout humid parts of Northern United States and under irrigation in arid regions. Adapted in Southern States, but of limited value in southern Coastal Plain. Vigorous; grows well on both wet and dry sites; does best on heavy soils. Palatability often problem in mixtures; should be grazed close for best animal acceptance and feeding value.

##### ALTA (Reg. No. 1)

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

*Source.*—In 1918 some of more promising lines of tall fescue from nursery at Pullman, Wash., established at Corvallis. Seed obtained from Max Heinrichs, Pullman. Three lines used—P.I.

19728, P.I. 24838, and P.I. 25206. P.I. 19728 received January 24, 1907, from A. LeCoq & Co., Darmstadt, Germany. P.I. 24838 from commercial lot of about 500 pounds of seed purchased from Peppard Seeds, Inc., Kansas City, Mo., March 9, 1909. P.I. 25206 from lot of seed presented by George Bitter, director of Botanic Garden, Bremen, Germany. This lot received by Plant Introduction Section, USDA, March 26, 1909.

*Method of Breeding.*—Evolved as ecotype selection. Material mentioned above planted in spring of 1918. Noted to have made exceptionally fine growth during first season. Received special mention in annual reports during 1919, 1920, 1921, and 1922. In winter of 1922-23 it suffered severe winterkilling. Surviving plants put together and became source seed of Selection 7. In 1927 designation of Selection 7 changed to FC 29366. Remained under this selection num-

ber until given name "Alta" in 1940. Recognized because of ability to remain green during dry summers in western Oregon and high yields of forage.

*Released.*—1940, cooperatively by Oregon Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Oregon Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

#### ALTA 4-36

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth and H. H. Rampton.

*Source.*—Alta tall fescue.

*Method of Breeding.*—Fifty selections from Alta variety grown under isolation; outstanding individuals selected from resulting progenies.

*Description.*—More dense than Alta, with finer leaf. Approximately equal to Alta in forage yield and crude protein content, but lower in seed yield.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Oregon Agricultural Experiment Station.

#### ASHEVILLE

Increased at SCS Nursery, Americus, Ga.—Paul Tabor and J. D. Powell.

*Source.*—Collection from naturalized stand 5 miles southwest of Asheville, N.C. Grown under experimental number SC 20-764.

*Description.*—Strain of tall fescue. More stable to adverse changes in environment than Kentucky 31 or Alta. Yield not greater than that of Kentucky 31 or Alta. Observed superior to other kinds on soils that become too wet in winter and on rich soils during cold winter.

*Released.*—Seed distributed by SCS in 1952.

*Breeder Seed.*—SCS Nursery, Americus.

*Certified Seed.*—Not available.

#### FAWN

Selected at Oregon Agricultural Experiment Station, Corvallis—R. V. Frakes and J. R. Cowan.

*Source.*—Named varieties and foreign introductions.

*Method of Breeding.*—Selection conducted in space-planted introduction nursery and clonal tests. Progenies evaluated, and eight parental clones selected for high chromogen content, high crude protein, high seed yield, low self-fertility, and desirable phenotypic appearance. Included in comparative tests as Oregon Synthetic E.

*Description.*—More spring vigor, earlier maturity, and greater height in spring than Alta and

Kentucky 31. In 1962 and 1963 produced 22 and 15 percent more forage, respectively, than Alta. Average seed yield for these 2 years exceeded that of Alta by 36 percent. Adapted for seed and forage production in Willamette Valley, Oreg.

*Released.*—1964, by Oregon Agricultural Experiment Station.

*Breeder Seed.*—Oregon Agricultural Experiment Station.

*Certified Seed.*—Not available. (Foundation seed available for allocation in fall of 1964.)

#### GOAR

Selected at Imperial Valley Field Station, El Centro, Calif.—L. G. Goar.

*Source.*—Original material came from D. Dagen of Budapest, Hungary, to Professor Southworth of University of Manitoba, Winnipeg, Canada. Received by P. B. Kennedy of California Agricultural Experiment Station, Davis, in March 1925. Accession number T.O. 899.

*Method of Breeding.*—Planted at El Centro in 1941; tall fescue types selected. Seed of this type received from L. G. Goar by Plant Materials Center, SCS, Pleasanton, Calif., and assigned accession number P-13847. Tested there in cooperation with California Agricultural Experiment Station since 1946.

*Description.*—Early-maturing, vigorous, rather coarse bunchgrass, with high fertility level. Strong seedling vigor. Well adapted to heavy-textured alkaline soils. Grows better during periods of high summer temperature than do other strains of tall fescue.

*Released.*—Certified by California Crop Improvement Association in 1946.

*Breeder Seed.*—California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton.

*Certified Seed.*—Available.

#### KENMONT

Increased at Kentucky Agricultural Experiment Station, Lexington—E. N. Fergus and R. C. Buckner.

*Source.*—Naturalized variety from southeastern Kentucky. Distributed by Kentucky Agricultural Experiment Station for testing as Kentucky 59G1-32.

*Description.*—Similar in appearance to Kentucky 31, but appears to develop somewhat more dense sod; produced slightly higher yields, especially in older stand. Performed better than other varieties tested in Montana, particularly in mid-season.

*Released.*—1963, by Montana Agricultural Experiment Station, Bozeman.

*Breeder Seed.*—Montana Agricultural Experiment Station.

*Certified Seed.*—Not available.

### KENTUCKY 31

Increased at Kentucky Agricultural Experiment Station, Lexington—E. N. Fergus.

*Source.*—William Suiter's farm in Menifee County, Ky. Collected by E. N. Fergus in 1931 for testing at Kentucky Agricultural Experiment Station. Apparently grown on Suiter's farm since 1887.

*Description.*—Wide adaptation to soil types and temperature extremes. Suited to upper South, where remains green all year with occasional exception of midsummer months. Very productive, but not too palatable. Excellent for erosion control.

*Released.*—Kentucky Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### KENTUCKY 45-50

Selected at Kentucky Agricultural Experiment Station, Lexington, ARS cooperating—R. C. Buckner.

*Source.*—Naturalized strains collected in Kentucky.

*Method of Breeding.*—Selectively grazed plants selfed, and progenies evaluated in space-planted nurseries. Promising selections included in polycross blocks, and progenies tested in sod plots for palatability. Vigorous S<sub>3</sub> family increased for testing as 45-50.

*Description.*—Improved palatability, less vigorous seedling development, and somewhat lower forage yield than Kentucky 31. Grows well in association with white clover. Relatively high level of resistance to foliar diseases.

*Released.*—No. Included in regional testing program and in grazing tests.

*Breeder Seed.*—Kentucky Agricultural Experiment Station.

### KENWELL

Selected at Kentucky Agricultural Experiment Station, Lexington, ARS cooperating—R. C. Buckner.

*Source.*—Naturalized strains collected in Kentucky.

*Method of Breeding.*—Selectively grazed plants selfed, and progenies evaluated in space-planted nurseries. Selections included in polycross blocks, and progenies screened in sod plots for palatability. Synthetic based on three S<sub>3</sub> families 45-50, 42-33, and 61-48.

*Description.*—Comparable to Kentucky 45-50 in palatability. Yields about same as Kentucky 31. Resistant to several foliar diseases. Appears to be less aggressive in mixtures than Kentucky 31.

*Released.*—Scheduled for cooperative release in 1965 by Kentucky Agricultural Experiment Station and Crops Research Division, ARS. Included in grazing trials and distributed for regional testing as Kentucky Synthetic.

*Breeder Seed.*—Kentucky Agricultural Experiment Station.

### TENNESSEE STRAINS

Selected at Tennessee Agricultural Experiment Station, Knoxville—J. K. Underwood.

*Source.*—Kentucky 31 tall fescue.

*Method of Breeding.*—Inbred 2 years and strains having similar characteristics crossed by transplanting side by side and either caging or bagging.

*Description.*—(1) Fine leaved, leafy, productive; has not been submitted to palatability test. (2) Low silicon line (0.97 percent); leaves very long, broad, flagged; early heading; very productive. (3) High silicon line (1.28 percent); leaves narrower, stiff pointed, not flagged; 7-10 days later than (2) in heading and ripening of seed.

*Released.*—No. Seed not available at present for testing purposes.

### *Festuca elatior* L., meadow fescue

Cool-season bunchgrass from Europe. Used for pasture and erosion control in humid parts of Northern United States. Grows well on moist, fertile soils, but subject to rust damage. Neither as high yielding nor as persistent as tall fescue. Varieties developed in Europe and elsewhere not generally adapted in United States.

### ENSIGN

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Basic nursery established from seed lots obtained from various European sources.

*Method of Breeding.*—Synthetic variety built up by combining several desirable clones selected in selfed-line breeding program.

*Description.*—Tall, upright, with uniform type of growth; leafy basal growth. Considered equal to most other strains in forage production; outstanding in seed production.

*Released.*—1944, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available in quantity.

#### MIMER

Developed by Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

*Source.*—Indigenous plants.

*Method of Breeding.*—Mass selection. Breeder seed produced generation after generation in isolation under natural conditions. Considered to be in genetic equilibrium under these conditions. Undesirable plants rogued prior to anthesis. Seed of remaining plants bulked to form breeder seed.

*Description.*—Similar to Ensign and common in growth pattern; similar to Ensign in maturity, but more resistant to leaf rust; higher yielding than Ensign or common; although not as leafy as common, almost as high in percent protein.

*Released.*—Plant Breeding Institute, Weibullsholm. Introduced into Canada by Ontario Seed Cleaners and Dealers, Ltd., Toronto.

*Breeder Seed.*—Plant Breeding Institute, Weibullsholm.

*Certified Seed.*—Available.

#### TRADER

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar and D. R. Gibson.

*Source.*—Basic nursery established from European varieties and strains.

*Method of Breeding.*—Synthetic variety developed from 15 progeny-tested clones.

*Description.*—Leafy; somewhat later in maturity than common. Good basal growth and recovery characteristics. Considerable resistance to leaf rust in comparison with common.

*Released.*—1963, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available in limited quantity by 1968.

### *Festuca idahoensis* Elmer, Idaho fescue

Cool-season, native bunchgrass found from Washington and Montana south to central California and Colorado. Prevalent at higher elevations in Montana, Idaho, and Utah. Valuable range grass, palatable in spring, cures well on stem, and makes good fall forage.

#### P-6435

Selected at Plant Materials Center, SCS, Pullman, Wash.—R. J. Olson and J. L. Schwendiman.

*Source.*—Collected from native Ponderosa pine-grassland association near Winchester, Idaho, by Donald Hedrick in 1938.

*Method of Breeding.*—Accession outstanding among 61 collections. Improved by mass selection during several generations.

*Description.*—Vigorous, long-lived perennial; bunch-type fescue. Excellent seedling vigor, strong root system. Dark-green, basal, abundant leaves. Seed culms spreading, abundant, up to 36 inches in height. Large, awned seeds. Seed production much better than that of any strain previously found.

*Released.*—No. Included in variety tests.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

### *Festuca ovina* L., sheep fescue

Cool-season bunchgrass indigenous in Northern Hemisphere. Used as durable turfgrass on sandy soils and for erosion control in Northern States. Cold and drought tolerant; succeeds better than most grasses on sandy, gravelly soils. Grazed well in early spring, but not widely used for pasture.

#### P-274

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—P.I. 109497; south of Konya, Turkey; introduced by Westover-Enlow expedition in 1934.

*Method of Breeding.*—Selections from spaced plantings in which aberrant types eliminated.

*Description.*—Dwarf, blue green, densely tufted, erect growing, with abundant fine stems. Leaves dense, short, stiff, harsh, abundant, basal. Adapted to dry sites in 8- to 14-inch rainfall areas and at high altitudes.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

***Festuca ovina* var. *duriuscula* (L.) Koch, hard fescue**

Cool-season bunchgrass from Europe. Useful in erosion control and soil improvement in parts of Pacific Northwest. Tougher leaves and less drought tolerant than sheep fescue.

**DURAR (Reg. No. 4)**

Selected at Plant Materials Center, SCS, Pullman, Wash.—V. B. Hawk and J. L. Schwendiman.

*Source.*—Collected from old planting on Eastern Oregon Branch Experiment Station, Union, in 1934 by V. B. Hawk.

*Method of Breeding.*—Mass selection for several generations. Increased for field testing as P-2517.

*Description.*—Tall, semierect growing, densely tufted, perennial bunchgrass. Differs from sheep fescue in its smoother, wider, longer, firmer leaf

blades. Large form of sheep fescue; closely related to Chewings fescue, but more drought resistant and more densely tufted. Heavy root producer, shade tolerant. Basal, harsh foliage. Consistently high seed production. Primary use is for soil protection on roadsides, ditchbanks, and as soil-improvement understory grass in orchards. In mixtures with alfalfa for hay, it is very heavy root producer. Widely adapted to rainfall areas of 14-30 inches and to well-drained irrigated soil.

*Released.*—1949 as P-2517, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Center, SCS, Pullman. Named Durar in 1963.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Available in quantity.

***Festuca rubra* L., red fescue**

Important cool-season, sod-forming grass introduced from Europe. Used for lawns, general-purpose turf, and erosion control. Occurs in pastures in Northern States and Pacific Northwest in relatively moist, cool areas. Grows over wide range of soil types; valued for its shade tolerance. Not highly palatable.

**CLATSOP**

Selected at Astoria Nursery Unit, SCS, Warrenton, Oreg., in cooperation with Oregon Agricultural Experiment Station, Corvallis—Robert L. Brown.

*Source.*—Maritime race collected from sandy plain at Florence, Oreg., in 1939.

*Method of Breeding.*—Seed collected from single plant in space-planted nursery. Increased under isolation as P-7153.

*Description.*—Narrow leaved, dark green, moderately tall, moderately rhizomatous. High forage and seed yield. Remains green throughout summer, hence fire resistant. No evidence of susceptibility to common diseases; cold tolerant.

*Released.*—No. Used in comparative strain tests in Western States. Used for permanent grass cover on stabilized coastal dunes in Oregon.

*Breeder Seed.*—Plant Materials Center, SCS, Corvallis.

**DURATURF**

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Scandinavian material.

*Method of Breeding.*—Mass selection.

*Description.*—Comparatively uniform, with dense bottom growth. Outstanding attribute is seed-producing ability. Because of uniformity, somewhat easier to harvest than more variable strains.

*Released.*—1943, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Instituté, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available.

**ILLAHEE (Reg. No. 2)**

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Scoth.

*Source.*—Seed lot imported in 1937 from England by Oscar Loe, Silverton, Oreg.

*Method of Breeding.*—Comparative tests at Corvallis and Beltsville, Md.

*Description.*—Turf variety, with fine stems and leaves, slow rate of spread. Produces dense, uniform, fine-textured turf. At Beltsville established more rapidly from fall seeding and more cold tolerant than five varieties of red fescue, including Oregon-grown commercial with which it was compared.

*Released.*—1950, cooperatively by Oregon Agricultural Experiment Station and Crops Research Division, ARS.



*Breeder Seed.*—Oregon Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### OLDS

Selected at School of Agriculture, Olds, Alberta, Canada.

*Description.*—Growth habit erect to spreading; perennial with short rootstalks. Few fertile shoots 35 to 60 cm. tall; relatively numerous long-leaved sterile shoots. Hardy to temperatures common throughout western Canada. Moderately drought tolerant. Not subject to disease in Alberta. Recommended for use in lawns, fairways, pastures, and for soil conservation.

*Released.*—School of Agriculture, Olds.

*Certified Seed.*—Available. (Certified in Canada and Pacific Northwest.)

### PENNLAWN (Reg. No. 3)

Selected at Pennsylvania Agricultural Experiment Station, University Park—H. B. Musser.

*Source.*—Individual plants selected from university golf-course fairways. This turf seeded approximately 30 years previously with seed of European origin.

*Method of Breeding.*—Screening tests of source material received from England, Hungary, Canada, and United States. Sod plugs collected from established turf and included in tests. Turf-quality tests of approximately 50 strains established at University Park and Beltsville, Md. Three superior strains (on basis of data from two locations) isolated for increase. Strains identified as F-55(38), F-74(38), and F-78(38).

*Description.*—Synthetic variety; produces better turf than any of original parents. Not immune to leaf spot diseases, but decidedly tolerant of them; not attacked severely and recovers rapidly. Good foliage density, rapid spread, ability to withstand close clipping.

*Released.*—1954, by Pennsylvania Agricultural Experiment Station.

*Breeder Seed.*—Pennsylvania Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### RAINIER

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Scoth.

*Source.*—Accession received in 1938.

*Description.*—High seed yielder, stiff stems, good turf developer, long lived, uniform dark green, rapid grower. Resistant to common leaf, stem, and head diseases in Pacific Northwest.

*Released.*—1944, cooperatively by Oregon Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Oregon Agricultural Experiment Station.

*Certified Seed.*—Available.

### RHODE ISLAND 6

Selected at Rhode Island Agricultural Experiment Station, Kingston—J. A. DeFrance.

*Source.*—Individual clone collected in 1953 from abandoned golf green at Beavertail Point, Jamestown, R.I.

*Method of Breeding.*—Comparative tests from first-generation seed. Parent material maintained vegetatively.

*Description.*—Fine leaves and stems, medium green, uniform appearance, good vigor. Appears to tolerate closer mowing than other red fescues. Good disease resistance, especially to pink patch. In pure stands attains greater density than do available varieties.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—Rhode Island Agricultural Experiment Station.

### *Festuca rubra* var. *commutata* Gaud., Chewings fescue

Cool-season bunchgrass from Europe. Used for lawns and general-purpose turf in humid

Northern States. Growth habit more erect than red fescue. Varieties not available.

### *Hilaria belangeri* (Steud.) Nash, curly mesquite

Warm-season, stoloniferous, native grass. Distributed from central Texas to Arizona and south to Central America. Valuable range grass in Texas; grows on dry, deep clay to gravelly or rocky

soils. Drought resistant; tolerates close grazing. Palatable; cures well on stem. Varieties not available.

***Hilaria jamesii* (Torr.) Benth., galleta**

Slightly spreading, native grass. Found from Wyoming and Nevada south to California and western Texas. Produces good forage yields in New Mexico and Arizona. Palatable during sum-

mer growing season, but harsh and unpalatable after growth ceases. Spreads by rhizomes under favorable conditions. Drought resistant; tolerant to heavy grazing. Varieties not available.

***Hilaria mutica* (Buckl.) Benth., tobosa**

Warm-season, slightly spreading, native grass. Distributed from western Texas to Arizona and south into Mexico. Most abundant in southern New Mexico and Arizona, especially on heavy soils

subject to flooding in rainy season. Moderately palatable during growing season, but dry and tough after growth ceases. Varieties not available.

***Lolium multiflorum* Lam., Italian ryegrass (also *L. multiflorum* × *L. perenne* and *L. multiflorum* × *L. rigidum* Gaud.)**

Major cool-season annual from Europe. Grown principally in Pacific Coast States west of Cascades and as winter annual in Southern United States. Used for pasture, hay, silage, cover crop, temporary lawns, and overseeding warm-season turfgrasses in Southern United States. Yields well on productive soils; palatable; tolerates heavy grazing. Subject to winterkilling in Northern States. Some common seed sources represent genetic mixtures of Italian and perennial ryegrass; hybrids between these two species used in developing improved varieties, which behave as short-lived perennials.

*Source.*—Selections from domestic ryegrass and introductions.

*Method of Breeding.*—Mass selection.

*Description.*—Rapid developing. Rust resistant. Appears to be in same early-maturity class as *La Estanzuela*; equals or surpasses it in rust resistance.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—North Florida Experiment Station, Quincy.

**GULF (Reg. No. 8)**

Increased at Rice Pasture Experiment Station, Beaumont, Tex., ARS cooperating—R. M. Weihing.

*Source.*—P.I. 193145, introduction of *La Estanzuela* 284 received from Uruguay.

*Method of Breeding.*—Comparative tests.

*Description.*—See *La Estanzuela* 284. Introductions varied in percentage of rust-resistant plants and in earliness. P.I. 193145 performed very well at Beaumont; relatively uniform as to maturity; relatively high percentage of rust-resistant plants.

*Released.*—1958, cooperatively by Texas Agricultural Experiment Station, College Station, and Crops Research Division, ARS.

*Breeder Seed.*—Rice Pasture Experiment Station.

*Certified Seed.*—Available.

**H-1**

Selected at Plant Research Bureau, Grasslands Division, Palmerston North, New Zealand.

*Source.*—Selection from artificial hybrid between *Lolium multiflorum* × *L. perenne*.

*Description.*—Combines high productive capacity and palatability of Italian ryegrass with

**ASTOR**

Selected at John Jacob Astor Branch Experiment Station, Astoria, Oreg.

*Source.*—Roskilde from Danish Farmers Seed Growers Association in Otoftegaard, Taastrup, Denmark.

*Method of Breeding.*—Seed obtained in 1954 was planted in 1955. Superior surviving plants in original planting increased vegetatively in 1959 and seed harvested for testing.

*Description.*—Superior in forage yield to other varieties of *Lolium multiflorum* at John Jacob Astor Branch Experiment Station. Considered to be well adapted to coastal areas of Oregon and southwestern Washington. Seed will be increased on limited generation basis.

*Released.*—1964, by Oregon Agricultural Experiment Station, Corvallis.

*Breeder Seed.*—Oregon Agricultural Experiment Station.

*Certified Seed.*—Available commercially in 1966 or 1967.

**FLORIDA RUST RESISTANT**

Selected at North Florida Experiment Station, Quincy—T. E. Webb.

some of permanence of perennial ryegrass. "Short-rotation" ryegrass. Winter production under New Zealand conditions superior to that of either parent. Requires good soil fertility.

*Released.*—In New Zealand. Included in regional testing program.

*Certified Seed.*—Not generally available in United States.

#### LA ESTANZUELA 284

Selected at La Estanzuela Experiment Station, Colonia, Uruguay.

*Description.*—Annual. Exhibits appreciable amount of rust resistance. Relatively early. More susceptible to cold injury than domestic ryegrass.

*Released.*—In commercial production in Uruguay. Several accessions important in ryegrass-breeding programs in United States. These include T.O. 1882, obtained by R. M. Love, California Agricultural Experiment Station, Davis; P.I. 193145, obtained by O. S. Aamodt, Crops Research Division, ARS, Beltsville, Md.; and P.I. 201980, presented by Albert Boerger, La Estanzuela, Colonia.

*Certified Seed.*—Not available in United States.

#### RYEGRASS 12

Selected at Plant Research Bureau, Grasslands Division, Palmerston North, New Zealand. Increased at California Agricultural Experiment Station, Davis, in 1943.

*Source.*—Selections from artificial hybrid between *Lolium multiflorum* × *L. perenne*.

*Description.*—Morphologically intermediate between parents. Variable; starts growth early and described as remaining green longer than annual ryegrass.

*Released.*—In New Zealand. Included in regional testing program.

*Certified Seed.*—Not generally available in United States.

#### STONEVILLE RUST-RESISTANT STRAINS

Selected at Delta Branch Experiment Station, Stoneville, Miss., ARS cooperating—H. W. Johnson, H. W. Bennett, and C. L. Blount.

*Source.*—P.I. 194395 introduced from Uruguay (contained 35-percent rust-resistant plants when random population of seedlings inoculated in greenhouse). P.I. 201980, introduction of La Estanzuela 284, obtained from Uruguay (contained 51-percent rust-resistant plants).

*Method of Breeding.*—

Strain 1.—Synthetic consisting of five open-pollinated lines selected from P.I. 194395. When

grown in progeny row nursery at McNeill, Miss., in 1953-54, these lines remained practically free of crown rust. In greenhouse tests at Stoneville five lines had following percentages of rust-resistant plants: 100, 95, 90, 86, and 83.

Strain 2.—Synthetic consisting of two S-2 lines derived from individual selfed plant of P.I. 194395. In greenhouse tests these lines contained 92- and 96-percent resistant plants.

Strain 3.—Synthetic consisting of three S-3 lines from one S-2 plant of P.I. 201980. In greenhouse tests these lines contained 96-, 91-, and 88-percent resistant plants.

*Description.*—Strains 1, 2, and 3 appear as productive as domestic ryegrass in tests conducted at Stoneville. Superior to La Estanzuela 284 in rust resistance.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Delta Branch Experiment Station.

#### TIFTON 1

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Homer Wells.

*Source.*—Westerwold's ryegrass.

*Method of Breeding.*—Five plants that appeared to be immune to rust selected from artificial inoculation tests. Progenies screened for rust in artificial tests; selections made to repeat cycle. Field selection being practiced for resistance to leaf spot diseases.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

#### WIMMERA 62 (Reg. No. 11)

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

*Source.*—Naturalized in Wimmera-Mallee areas of Victoria, Australia. Possibly hybrid between *Lolium rigidum* and *L. multiflorum*. Seed obtained from F. H. Brunning, Ltd., Melbourne, Australia. Increased at Plant Materials Center, SCS, Pleasanton, and SCS Nursery, San Fernando, Calif., as P-11419.

*Method of Breeding.*—Natural selection and roguing for 13 generations at Plant Materials Center, SCS, Pleasanton.

*Description.*—Awnless, deep bright green, erect, early-maturing annual. Tends to lodge first year in brush-burn seedings. Uniform in appearance, leafy, with numerous culms. Provides rapid temporary cover for erosion control. No advantage over common ryegrass in areas of high humidity or on fertile soils where rainfall exceeds 12 inches annually.

*Released.*—1962, cooperatively by California Agricultural Experiment Station, Davis, and Plant Materials Center, SCS, Pleasanton.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

*Certified Seed.*—Available.

### ***Lolium perenne* L., perennial ryegrass**

Important cool-season bunchgrass from Europe. Well adapted in Pacific Northwest. Widely used in mixtures for pasture, hay, lawns, and erosion control. Does best in cool, moist regions with mild winters; grows well on heavy soils; tolerates heavy grazing. Nutritious, palatable. Not recommended as lawngrass.

of Oregon perennial ryegrass and bright green. Very good tolerance to summer heat and improved tolerance to drought and winter injury. Produces above-average turf in areas where perennial ryegrass is adapted.

*Released.*—1962, by Northrup, King & Co.

*Breeder Seed.*—Northrup, King & Co.

*Certified Seed.*—Not available. (Available commercially.)

#### **LINN**

Selected at Oregon Agricultural Experiment Station, Corvallis.

*Source.*—Introduced from New Zealand in 1928. Original introduction grown on one farm for 4 years; seed harvested to establish plantings on two farms where this particular source grown since 1932.

*Method of Breeding.*—Source identified and selected for certification on basis of field inspections and comparative tests. Linn 1 and Linn 2 refer to two experimental seed lots subsequently bulked for seed production because they were comparable in seed-producing potential.

*Description.*—Representative of best Oregon perennial types. Good seed yield and typical perennial characteristics. Increased on limited generation basis with two classes of seed—registered and certified.

*Released.*—1961, by Oregon Agricultural Experiment Station.

*Breeder Seed.*—Oregon Agricultural Experiment Station. (Registered seed class produced on approved farms.)

*Certified Seed.*—Available.

#### **NK-100**

Developed by Northrup, King & Co., Minneapolis, Minn.

*Source.*—S-23 × Oregon perennial ryegrass.

*Method of Breeding.*—Mass selection for persistence, leafy growth habit, and seed production, with some selection for rust tolerance. Tested under turf conditions with emphasis on winter and summer persistence, turf quality, and color. Synthetic variety maintained by harvesting seed from approximately 100 typical plants out of breeder's field.

*Description.*—Heavy tillering, leafy, medium-late variety. Leaves slightly narrower than those

#### **NORLEA**

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Worldwide collection of seed lots.

*Method of Breeding.*—Repeated selection and progeny evaluation through six generations; in final synthesis 12 proven clones involved.

*Description.*—Sufficient hardiness to survive and to be productive in areas where species had been of little or no value. Leafy, somewhat later in maturity than short-ley ryegrass strains. Susceptible to leaf rust in some areas, but susceptibility does not appear to affect yield, since it consistently outyielded other varieties in forage and seed production.

*Released.*—1958, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available in quantity.

#### **P-312**

Increased at Plant Materials Center, SCS, Pullman, Wash.

*Source.*—P.I. 107071 from Turkestan, U.S.S.R.; introduced by Westover-Enlow expedition in 1934. Labeled "*Lolium rigidum*"; reidentified in 1938 as *L. remotum* Schrank; subsequently classed as *L. perenne*.

*Method of Breeding.*—Mass selection for several generations.

*Description.*—Consistently more winter hardy, more productive, and longer lived than other strains of perennial ryegrass at Pullman. Uniform; free from annual and short-lived plants. Erect growing, leafy, completely awnless.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Plant Materials Center, SCS, and Washington Agricultural Experiment Station, Pullman.

### PELO

Developed by D. J. van der Have, Kapelle-Biezelinge, Netherlands.

*Source.*—Collection of plants from old pastures in eastern parts of Holland.

*Method of Breeding.*—Plants selected for tillering capacity, hardiness, and late flowering. Polycross tested with selection based on weekly and five-harvests-per-year treatments. Four plants selected to produce synthetic variety. Evaluated for turf purposes in United States beginning in 1957.

*Description.*—Leafy, late flowering, with good tillering capacity and persistence under both field and turf management. Better winter hardiness than Lynn perennial ryegrass. Improved heat and drought tolerance. Good tolerance to rust. Produces above-average turf in areas where perennial ryegrass is adapted.

*Released.*—Holland, 1959, by D. J. van der Have; in United States, 1964, by Northrup, King & Co.

*Breeder Seed.*—D. J. van der Have.

*Certified Seed.*—Available under OECD scheme.

### S-23

Selected at Welsh Plant Breeding Station, Aberystwyth, Great Britain.

*Source.*—Material obtained from old grazed pastures (Midlands, Kent, Lincolnshire, England; Wales; Holland).

*Description.*—Spreading growth, late flowering, high tillering, dense, leafy. Very persistent under grazing.

*Released.*—Welsh Plant Breeding Station. Included in regional testing program.

*Certified Seed.*—Available from Great Britain.

### S-24

Selected at Welsh Plant Breeding Station, Aberystwyth, Great Britain.

*Source.*—Based primarily on two wild plants, but not from old grazed pasture. These plants interbred and further "native" basic plant material added. Also some plants from produce of Hawke's Bay, New Zealand, seed selected and incorporated in strain.

*Description.*—In Great Britain more persistent and leafier than most ordinary strains. Capable of producing heavy crops and good aftermath. Starts growth earlier than most ordinary strains.

*Released.*—Welsh Plant Breeding Station. Included in regional testing program.

*Certified Seed.*—Available from Great Britain.

### S-101

Selected at Welsh Plant Breeding Station, Aberystwyth, Great Britain.

*Source.*—Based entirely on plants derived from very old pastures of Midlands and Kent, England.

*Description.*—Flowers only slightly earlier than those of S-23; plants less spreading, leaf blades longer and often broader. Leafy, dual-purpose strain approaching hay type.

*Released.*—Welsh Plant Breeding Station. Included in regional testing program.

*Certified Seed.*—Available from Great Britain.

## **Oryzopsis hymenoides (Roem. and Schult.) Ricker, Indian ricegrass**

Valuable cool-season, native bunchgrass. Widely distributed as mixture with other native grasses over Western United States from North Dakota to Washington and south to California and Texas. Adapted to dry, sandy soils; drought resistant. Nutritious, palatable; good as standing winter feed. High level of seed dormancy restricts use.

### P-2575

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Native collection made in 1935, 5 miles south of White Bird, Idaho.

*Method of Breeding.*—Selected from among 152 accessions for its good vegetative characteristics and low hard-seed content. Selection repeated through several generations before initial increase.

*Description.*—Large, erect plant type. Robust stems; broad, flat, abundant leaves; medium-small, dark, almost naked, elongate seeds. Excellent seedling vigor, averaging less than 50 percent of hard seeds.

*Released.*—No. Distributed for testing purposes.

*Breeder Seed.*—Plant Materials Center, SCS, Aberdeen, Idaho.

***Oryzopsis miliacea* (L.) Benth. and Hook., smilgrass**

Cool-season bunchgrass. Used primarily in range seedings in central and southern California.

Increased at California Agricultural Experiment Station, Davis.

*Source.*—Introduced from Mediterranean region; first tested at California Agricultural Experiment Station in 1879.

*Description.*—Drought resistant, perennial bunchgrass, with about same climatic adaptation as hardinggrass, but does better on lighter soils.

Difficult to obtain stands except in ash of brush burns or on very light soils. Less palatable than veldtgrass or hardinggrass.

*Released.*—Certified by California Crop Improvement Association in 1947.

*Breeder Seed.*—California Agricultural Experiment Station and Plant Materials Center, SCS, Pleasanton, Calif.

*Certified Seed.*—Available in quantity.

***Panicum antidotale* Retz., blue panicgrass**

Warm-season, sod-forming grass native to India and introduced from Australia in 1912. Important in parts of Southwestern United States for dryland and irrigated pastures and erosion control. Not winter hardy. Coarse, vigorous, extensive root system. High forage and seed yields. Grows best on fertile, well-drained soils; responds to nitrogen.

**A-130**

Increased at SCS Nursery, Tucson, Ariz.

*Source.*—Australia.

*Description.*—Original increase of blue panicgrass widely used in Texas and in Southwestern United States.

*Released.*—1950, cooperatively by Arizona Agricultural Experiment Station and SCS Nursery, Tucson.

*Breeder Seed.*—Plant Materials Center, SCS, Tucson.

*Certified Seed.*—Available.

**T-15327**

Selected at SCS Nursery, Woodward, Okla., OK-N-2—James E. Smith, Jr., and Gordon L. Powers.

*Source.*—Bulk common strain of blue panicgrass derived from commercial increase of SCS Nursery, Tucson, Ariz., accession A-130. Increased for testing as T-15327.

*Method of Breeding.*—One-year-old seedlings that survived  $-18^{\circ}$  F. in dryland field planting in-

creased clonally; extremes in height, plant texture, and dates of flowering discarded; remaining plants bulked.

*Description.*—Relatively uniform, leafy, medium-fine stems. Heavy seed producer. Considered to be more cold tolerant than common strain available.

*Released.*—Informally by SCS Nurseries, Woodward and Tucson, in 1949.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (In commercial production.)

**TEXAS SYNTHETIC 63-4**

Selected at Texas Agricultural Experiment Station, College Station—E. C. Holt.

*Source.*—Plant introductions and SCS accession T-115.

*Method of Breeding.*—Original population of spaced plants evaluated visually for vigor and leafiness. Outstanding plants isolated in crossing block; polycross progeny evaluated both visually and quantitatively. Seven clones from polycross progeny selected for crossing and increase.

*Description.*—Vigorous, dense, leafy plants, with relatively large stems. Total yield (vigor) and leaf yield greater than yields of common blue panicgrass. Neither leaf percentage nor leaf-stem ratio appreciably greater than common.

*Released.*—No. Tested locally.

*Breeder Seed.*—Texas Agricultural Experiment Station.

***Panicum coloratum* L., kleingrass**

Warm-season "species complex" introduced from Africa. Includes bunchgrasses and spreading types used for hay, pasture, and silage, primarily in southern Texas. Adapted to moist, heavy soils. Withstands considerable drought; not cold tolerant. Seed subject to shattering. Makarikarigrass (*Panicum coloratum* var. *ma-*

*karikariense* Goossens) more drought resistant than type species.

**A-12638**

Increased at Plant Materials Center, SCS, Tucson, Ariz.—L. P. Hamilton and T. F. Spaller.

*Source*.—From Lake Makarikari region, Union of South Africa; introduced as P.I. 142284.

*Method of Breeding*.—Cold-hardy plants selected from original accession.

*Description*.—Erect bunchgrass, blue green, leafy. Produces three-fourths forage volume of blue panicgrass. Not woody at maturity.

*Released*.—No.

*Breeder Seed*.—Plant Materials Center, SCS, Tucson.

#### A-14156

Increased at Plant Materials Center, SCS, Tucson, Ariz.—L. P. Hamilton and T. F. Spaller.

*Source*.—From Kenhardt, Union of South Africa; introduced as P.I. 190327. Identified as *Panicum stapffianum* Fourcade; belongs to *P. coloratum* complex.

*Description*.—Erect, leafy bunchgrass. Produces two-thirds volume of blue panicgrass. Not woody at maturity. Cold hardiness comparable to that of A-130 blue panicgrass.

*Released*.—No. Included in local tests.

*Breeder Seed*.—Plant Materials Centers, SCS, Los Lunas, N. Mex., and Tucson.

#### SELECTION 75

Selected at SCS Nursery, San Antonio, Tex.—James E. Smith, Jr.

*Source*.—Introduced from Kimberley, Union of South Africa. Received March 1952 as P.I. 166400, BN-5225; increased for testing as T-20275.

*Method of Breeding*.—Selected as best in forage production from large number of similar African accessions.

*Description*.—Plants mostly erect, but variable

in form. Dark green to glaucous, leafy. Slender stems to 4 feet at seed maturity. Excellent forage production. Good drought tolerance; tolerant of moderate salinity. Plants remain green late in fall and resume active growth very early in spring. Trailing stems in contact with moist soil root at nodes to form loose sod. Adapted in Texas on medium to heavy soils under 20 inches or more annual rainfall except north of Lubbock.

*Released*.—Informally by SCS in 1957.

*Breeder Seed*.—Plant Materials Center, SCS, San Antonio.

*Certified Seed*.—Not available. (In limited commercial production.)

#### TEXAS SYNTHETIC 63-1

Selected at Texas Agricultural Experiment Station, College Station—E. C. Holt.

*Source*.—Plant introductions from Africa.

*Method of Breeding*.—Self- and open-pollinated seed collected from plants with upright growth habit in space-planted nurseries of *Panicum coloratum* introductions. From progeny nursery established from these seed, 10 clones selected and placed in isolation block for crossing. Second cycle of selection among polycross progeny resulted in eight clones, which were isolated and seed bulked for increase.

*Description*.—Plants erect, dense, and leafy as contrasted with wide range of growth habits and density in bulk populations. Forage and seed production equal or superior to bulk populations of species.

*Released*.—No. Tested locally.

*Breeder Seed*.—Texas Agricultural Experiment Station.

#### *Panicum maximum* Jacq., guineagrass

Warm-season, slightly spreading grass from Africa. Used to limited extent for pasture and silage in Florida and parts of southern Texas and California. Tall, rather coarse. Adapted in moist regions, but tolerates some drought; not cold tolerant; grows well on fertile soils. Nutritive value high when leafy and green. Established vegetatively and from sod. Several varieties available in tropical regions. Slender guineagrass

(*Panicum maximum* var. *publigrume* K. Schum), small, slender variety with finer leaves than common, and Purple Top (*P. maximum* var. *coloratum*), low, coarse variety; both grown in Queensland, Australia. Brazilian varieties include ordinary robust type of common and Sempre-Verde (*P. bulbosum* q.v.), fine-leaved, drought-resistant type. Identifiable varieties grown in Puerto Rico, Jamaica, and Hawaii.

#### *Panicum obtusum* H.B.K., vine mesquite

Warm-season, sod-forming, native grass. Distributed from western Missouri and southern Colorado to Texas, Arizona, and Mexico. Used for grazing and erosion control. Develops long stolons. Grows well on fine, compact soils. Less

drought resistant than many grasses adapted to arid Southwest; not cold tolerant. Feeding value of immature forage fair to good. Varieties not available.

***Panicum ramosum* L., browntop millet**

Warm-season annual from Asia. Used for wild-bird feed and as minor forage plant in Southeastern United States. Not aggressive. Short

season of growth; requires fertile soil and good moisture. No varieties available.

***Panicum repens* L., torpedograss**

Warm-season, sod-forming grass indigenous to tropical and subtropical coasts of both hemispheres. Restricted distribution and use for pasture and erosion control from Florida along gulf coast to Texas. Grows on coarse sands and wet

muck soils. Very aggressive and may become serious weed. Not cold resistant, but tolerant to grazing unless heavily used. Palatable, but less nutritious than pangolagrass. Propagated vegetatively. Varieties not available.

***Panicum virgatum* L., switchgrass**

Important warm-season, native, sod-forming grass. Occurs throughout most of United States. Especially valuable for forage, pasture, and erosion control in central and southern parts of Great Plains. Most abundant on relatively moist, fertile areas. Coarse-stemmed, vigorous root system; short rhizomes. High yields of seed and forage. Good seedling vigor. Quality acceptable during periods of rapid growth, but low as standing winter feed.

**BLACKWELL**

Selected at Plant Materials Center, SCS, Manhattan, Kans.—D. R. Cornelius.

*Source*.—Seed harvested in 1934 from single plant growing in native prairie near Blackwell, Okla.

*Method of Breeding*.—Single plant selected in comparison with many other collections at SCS Nursery, Manhattan. Tested as KG-208.

*Description*.—Upland-type switchgrass of medium height, with rather large stems. Ranked high in leafiness, total forage produced, and resistance to rust and other diseases. Good seedling vigor. Consistently produced 400 pounds of seed or better per acre under irrigation. Wide adaptation in range seedings, pasture plantings, waterways, and other permanent plantings in Kansas, Oklahoma, southern Nebraska, and northern Texas in areas of 20 inches or more of annual precipitation. Will grow on sandy ranges and favorable lowland sites in area of 15-20 inches of annual precipitation.

*Released*.—1944, cooperatively by Kansas Agricultural Experiment Station and Plant Materials Center, SCS, Manhattan.

*Breeder Seed*.—Plant Materials Center, SCS, Manhattan.

*Certified Seed*.—Available.

**CADDO (Reg. No. 4)**

Selected at Oklahoma Agricultural Experiment Station, Stillwater, ARS cooperating—Hi W. Staten, W. C. Elder, R. A. Chessmore, and J. R. Harlan.

*Source*.—Field collections from southern Great Plains, especially central Oklahoma.

*Method of Breeding*.—Mass selection in space-planted nurseries, with elimination of undesirable types. Process repeated, using most promising lines; seed from selected plants used to establish rows. Five rows selected for uniformity and superior production; seed bulked to form experimental strain 4200.

*Description*.—Tall, robust, upland switchgrass generally characteristic of central Oklahoma. Leafy, productive, considerable rust resistance, rather uniform when seeded in rows for seed production. Gives heavy yield of seed under favorable conditions. Forage yield under irrigation outstanding for native grass; recovers well after mowing. No special features distinguish it positively from other varieties, but tends to be greener and contains less red pigment in stems and heads than many other varieties.

*Released*.—1955, cooperatively by Oklahoma Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed*.—Oklahoma Agricultural Experiment Station.

*Certified Seed*.—Available.

**GRENVILLE**

Increased at former SCS Nursery, Albuquerque, N. Mex.

*Source*.—Collection near Grenville, N. Mex., at elevation of 5,900 feet and annual precipitation of 16 inches.

*Method of Breeding*.—Bulk increase of source material. Selected for increase from among oth-



ers in comparison rows because of better seedling vigor, growth habit, and seed production at location tested.

*Description.*—Intermediate type between northern and southern geographic strains. Plants uniform, leafy, fine stemmed, and remain green well into fall. Height at maturity 3 to 4 feet. Medium maturity date. No rust or other diseases observed.

*Released.*—Informally through SCS in Texas. Recognized for certification by New Mexico Crop Improvement Association.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas, N. Mex.

*Certified Seed.*—Available in limited quantity.

### KANLOW

Developed at Kansas Agricultural Experiment Station, Manhattan, ARS cooperating—F. L. Barnett and K. L. Anderson.

*Source.*—SCS collection from lowland site near Wetumka, Okla., in 1957.

*Method of Breeding.*—Collection planted at Manhattan in spring of 1958; 200 plants selected for leafiness, vigor, and retention of green late in season; selections isolated at Ashland Farm near Manhattan.

*Description.*—Tall, coarse, productive, especially adapted to lowlands where flooding, high water table, or other excess water problems occur, but performs well on upland where soils are not too thin or droughty. Not intended to replace upland varieties, such as Caddo and Blackwell, but to supplement them because of adaptation to wet locations.

*Released.*—1963, cooperatively by Kansas Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Kansas Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity in 1964.

### NEBRASKA 28

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS and SCS cooperating—L. C. Newell.

*Source.*—Native stand of switchgrass collected in Holt County, Nebr., in 1935.

*Method of Breeding.*—Spaced plants grown at this experiment station from original collection selected for type and allowed to cross-pollinate in isolation. Resulting seed bulked and increased.

*Description.*—Relatively early-maturing strain of switchgrass, representative of Nebraska sandhill types. Average plants semidecumbent, with fine stems of moderate height, bluish green, and leafy; but considerable variation in plant type exists. Well adapted to diverse soils and used successfully for pasturage and soil-conservation purposes, such as seeded waterways in pure stands or mixtures. Matures seed in mid-August to early September. In areas with longer growing seasons is susceptible to rust, which is likely to be serious factor in production.

*Released.*—1949, cooperatively by Nebraska Agricultural Experiment Station; Crops Research Division, ARS; and Nursery Division, SCS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### SUMMER

Selected at South Dakota Agricultural Experiment Station, Brookings—James G. Ross.

*Source.*—Native collection, P.I. 214759, made by W. L. Tolstead and L. C. Newell south of Nebraska City, Nebr., in 1953.

*Method of Breeding.*—Collection found superior when grown at Brookings. Mass selection for earliness, leafiness, and rust resistance. Selections from replicated nursery of progenies from these plants made and placed in polycross. Since high degree of uniformity of desirable type was present, foundation field was established from seed harvested from this nursery.

*Description.*—Tall, upright, with abundant, somewhat coarse leaves. Starts growth after June 1 and matures seed in mid-September. Produces high yield of forage and seed.

*Released.*—1963, by South Dakota Agricultural Experiment Station.

*Breeder Seed.*—South Dakota Agricultural Experiment Station.

*Certified Seed.*—Available.

### *Paspalum dilatatum* Poir., dallisgrass

Major warm-season, slightly spreading bunchgrass introduced from Argentina or Uruguay in mid-1800's. Used for pasture throughout much of Cotton Belt wherever annual rainfall is as much as 30 inches. Grows better than bermudagrass on wet soils. Palatable, nutritious. Tolerates moderately close grazing, and should be grazed to pre-

vent accumulation of dead leaves and stalks. Serious weed in lawns.

### B-230

Selected at Louisiana Agricultural Experiment Station, Baton Rouge—C. R. Owen.

*Source*.—Lot B of seven lots of seed collected from natural stands in lower Red River bottom. Selection made in 1941.

*Method of Breeding*.—Plant selection followed by progeny testing for seed quality and forage vigor evaluation. Tested in new strain-evaluation experiments where seed yields, seed quality, and forage were compared.

*Description*.—Not distinguishable from common dallisgrass. Produces better quality seed than common dallisgrass by about 30 percent. Remains green later in fall and begins growth earlier in spring.

*Released*.—1951, cooperatively by Louisiana Agricultural Experiment Station and Louisiana Crop Improvement Association.

*Breeder Seed*.—Louisiana Agricultural Experiment Station.

*Certified Seed*.—Not available.

### B-430

Selected at Louisiana Agricultural Experiment Station, Baton Rouge—C. R. Owen.

*Source*.—Nursery from which selection taken planted from seed collected in same area. Selection made in 1943 in space-planted nursery at Hamburg, La.

*Method of Breeding*.—Plant selection for normal forage type, which excelled in viable seed produced. Tested in progeny row and extended to new strain test where both seed and forage production compared.

*Description*.—No definite distinguishing char-

acteristics for identification. Exceeded average of strains included by 32 percent for pure seed content. Ergot-infected florets amounted to 28 percent less than average.

*Released*.—1951, cooperatively by Louisiana Agricultural Experiment Station and Louisiana Crop Improvement Association.

*Breeder Seed*.—Louisiana Agricultural Experiment Station.

*Certified Seed*.—Not available.

### PROSTRATE

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source*.—Obtained from Ben Smith, North Carolina Agricultural Experiment Station, Raleigh, who received it from Bernardo Rosengurt of Montevideo, Uruguay.

*Method of Breeding*.—Seeds from several progenies that appeared to be similar in type and 100-percent apomictic were blended and increased to furnish seed released in regional tests.

*Description*.—More prostrate, more resistant to foliage diseases, more persistent, maintaining good stands much longer than common dallisgrass. Outyielded common dallisgrass in clipping tests at Tifton. Very susceptible to ergot, very irregular in meiosis, poor in seed production.

*Released*.—No. Included in regional testing program.

*Breeder Seed*.—Georgia Coastal Plain Experiment Station.

### *Paspalum nicorae* Parodi, brunswickgrass

Increased at SCS Nursery, Americus, Ga.—Paul Tabor.

*Source*.—Sprigs dug March 1, 1945, at Brunswick, Ga. Grown under experimental number SC 20-672.

*Description*.—Rhizomatous species generally

similar to bahiagrass. More than two-seed racemes per stem. Some plants glaucous, others light green. Dense sod produced.

*Released*.—No.

*Breeder Seed*.—Plant Materials Center, SCS, Americus.

### *Paspalum notatum* Flügge, bahiagrass

Major warm-season grass that spreads slowly by short stolons. One of first USDA introductions from Brazil in 1914. Common bahiagrass adapted in Florida and lower Coastal Plain. Rated as more palatable but less winter hardy than Pensacola. Aggressive species that spreads rapidly from seed. Well suited for pasture use on sandy soils of low fertility or where good fertilizer programs are not maintained.

### ARGENTINE

Selected at Florida Agricultural Experiment Station, Gainesville, ARS cooperating—George Ritchey.

*Source*.—P.I. 148996 from Argentina; seed presented by Lorenzo R. Parodi.

*Method of Breeding*.—Selected as one of two distinct types from this introduction in 1945. Plots and pastures planted in 1945-46.

*Description.*—Wider leaves than those of Pensacola, but narrower than those of common. Preferred by cattle. Medium cold resistance, making most growth during midsummer. Very susceptible to ergot. Adapted throughout Florida and coastal areas of other Southern States.

*Released.*—1949-50, cooperatively by Florida Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Available commercially.)

### PARAGUAY

*Source.*—Origin obscure. Presumably traces to early introductions that became established along Gulf of Mexico.

*Description.*—Coarse, tough. Leaves shorter and hairier than those of Pensacola. Used to some extent as general-purpose turfgrass.

*Released.*—No.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Some commercial production in Texas.)

### PARAGUAY 22

Increased at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—J. L. Stephens.

*Source.*—P.I. 158822 collected by J. L. Stephens in Paraguay in 1947.

*Method of Breeding.*—Selection of one plant in source nursery. Progeny tests indicated that selection was true breeding and probably 100-percent apomictic.

*Released.*—No. Included in regional testing program as Tifton bahiagrass.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

*Certified Seed.*—Not available. (Some commercial production.)

### PENSACOLA

Found by county agent, Ed Finlayson, Pensacola, Fla. Sprigs from vacant lot on Government Street, Pensacola, taken to SCS Nursery, Americus, Ga., in May 1940 by Paul Tabor.

*Source.*—Plants growing along docks and railroad tracks at Pensacola. Thought to have arrived by fruit boat from Central or South America.

*Method of Breeding.*—Comparative tests conducted at several experiment stations. Experimental pastures and plots for forage yield and chemical composition planted at Gainesville, Fla., in 1942.

*Description.*—Similar to common bahiagrass, except more cold hardy, narrower blades, smaller seed, and more responsive to fertilization. Seed

germination excellent, with full stands and ground cover in 8-12 weeks. Adapted throughout southeastern Coastal Plain area and to all Florida.

*Released.*—Approved as superior forage by Florida Agricultural Experiment Station, Gainesville, in 1944. Seed distributed by SCS Nursery, in Americus, 1942, with first large-scale distribution in 1944.

*Breeder Seed.*—Plant Materials Center, SCS, Americus.

*Certified Seed.*—Available in quantity.

### PENSACOLA X COMMON

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—F<sub>1</sub> hybrid between selected plants from Pensacola bahiagrass and common broadleaved bahiagrass.

*Method of Breeding.*—Triploid from cross—Pensacola (diploid) × common (tetraploid). Sterile in isolation, but seeds well when interplanted with pollinator, such as Pensacola bahiagrass. Seeds produced give rise to uniform progeny exactly like female parent, indicating reproduction by apomixis.

*Description.*—Broader, more tender leaves, more palatable than Pensacola bahiagrass. Outyielded common parent twofold and Pensacola parent by 10 to 15 percent in replicated clipping tests.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

### TIFHI 1 (Reg. No. 1)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—Developed from selected clones coming from commercial Pensacola bahiagrass.

*Method of Breeding.*—Selected clones of Pensacola tested for general combining ability in poly-cross tests. Best of these tested for specific combining ability in single crosses. Two of best that were self-sterile and cross fertile and gave good single cross carry test numbers 14 and 108. Interplanted vegetatively in strips up to 30 feet wide to establish seed-production fields, where hybrid seed may be produced simply by combining all seed produced. Distributed for testing as Pensacola hybrid 14 × 108.

*Description.*—Slightly leafier than commercial Pensacola. One of parents (selection 108) more shatter resistant, facilitating seed production. Hybrid carries considerable heterosis, yielding up to 25 percent more forage than that of commercial check. In 4-year grazing test in replicated pastures produced 69 pounds more beef per acre per

year than commercial Pensacola—statistically significant difference.

*Released.*—1957, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS. Replaced by Tifhi 2.

### TIFHI 2

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—Developed from selected clones of commercial Pensacola bahiagrass.

*Method of Breeding.*—Selected clones of Pensacola tested for general combining ability in poly-cross tests. Best of these tested for specific combining ability in single crosses. Two of best that were self-sterile and cross fertile and gave good single cross carry test numbers 18 and 108. Interplanted vegetatively in strips up to 30 feet wide to establish seed-production fields, where hybrid seed may be produced simply by combining all seed produced. Distributed for testing as Pensacola hybrid 18 × 108.

*Description.*—Slightly leafier than common Pensacola. Both parents more shatter resistant

and much better seeders. Tifhi 2 more disease resistant than Tifhi 1 or common Pensacola. Over 4-year period Tifhi 2 yielded 7 percent more dry forage than Tifhi 1.

*Released.*—1961, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Seed.*—Available in limited quantity.

### WILMINGTON

Increased at SCS Nursery, Rock Hill, S.C.

*Source.*—Collected in 1940 from naturalized stand near Wilmington, N.C., by Paul Tabor. Tested under SC 20-338.

*Description.*—Narrow-leaf, cold-hardy bahiagrass; makes dense sod; plants of medium size. Only bahiagrass not injured by cold at Chapel Hill, N.C., between 1941 and 1953.

*Released.*—No formal release. Seed distributed from SCS Nursery, Rock Hill, in 1943.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Limited commercial supply.)

### *Paspalum urvillei* Steud., vaseygrass

Warm-season bunchgrass introduced from Argentina prior to 1880. Distributed from North Carolina to Florida and west to Texas, common

along gulf coast. Grows well on wet land; eliminated by close grazing. Seed shatters readily. Varieties not available.

### *Pennisetum ciliare* (L.) Link, buffelgrass

Warm-season grass from Union of South Africa. Includes bunch and spreading types. Used for pasture in southern Texas and to limited extent in parts of Gulf Coast States. Adapted to lighter sandy soils; responds to fertilizer. Good seedling vigor. Drought resistant; not cold tolerant; withstands fairly heavy grazing. Nutritious.

### BLUE

Selected at SCS Nursery, San Antonio, Tex.—James E. Smith, Jr.

*Source.*—Pretoria, Union of South Africa, P.I. 133898. Received March 1940; increased for testing as T-3782.

*Method of Breeding.*—Selected as most vigorous and productive of 21 similar accessions from Union of South Africa.

*Description.*—Selected over other similar accessions because of early spring growth recovery (about 3 weeks ahead of T-4464 buffelgrass), vigorous summer growth, high forage production,

rapid spread by means of short rhizomes, drought tolerance, resistance to injury by leafhoppers and aphids, and tolerance to light frost (active growth continues in fall about 3 weeks longer than for T-4464 buffelgrass). Best adapted to clay soils in Texas from Sonora eastward and Waco southward. Relatively low seed producer; limited in use within its area of adaptation by chronic shortage of commercial seed supplies. Both green and cured forage readily eaten by cattle.

*Released.*—Informally by SCS in 1952.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (In commercial production.)

### P.I. 155084

Increased at SCS Nursery, Brooksville, Fla.

*Source.*—Obtained from Van Rensburg, Pretoria, Union of South Africa, in 1947 as P.I. 155084. This accession represents Equator strain originally from British East Africa.

*Description.*—Light-bluish foliage. Makes only few seed heads as compared with *Pennisetum ciliare* sold commercially. Viable seed. Tillers and spreads by rather stout, sharp-pointed, round, smooth rhizomes. Culms grow to be about 4 feet tall under moderate fertilization. Leaves longer and stiffer than those of commercial buffelgrass. Stems become woody upon maturity. Foliage palatable and nutritious. Grass has odor of molasses similar to that emitted by molassesgrass (*Melinis minutiflora* Beauv.).

*Released.*—No. Increased for testing.

*Breeder Seed.*—Plant Materials Center, SCS, Arcadia, Fla.

*Certified Seed.*—Not available.

#### T-4464

Selected at SCS Nursery, San Antonio, Tex.—David H. Foster.

*Source.*—Pretoria, Union of South Africa. P.I. 153671, BN-4112. Received April 1946; increased for testing as T-4464.

*Method of Breeding.*—Selected as most vigorous and productive of large number of similar accessions from Union of South Africa and other countries.

*Description.*—Leafy, perennial bunchgrass, especially well adapted to deep sandy soils in section of Texas where winter temperatures seldom fall as low as 0° F. Heavy seed producer, with yields of 300–600 pounds per acre not uncommon under irrigation. Plants characteristically light green, with good seedling vigor, good drought tolerance, and ability to grow rapidly from early spring through hot summer. Stems may reach 48 inches in height at seed maturity.

*Released.*—Informally by SCS in 1949.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (Ample commercial supplies.)

### *Pennisetum clandestinum* Hachst., kikuyugrass

Warm-season, sod-forming grass from Africa. Not recommended in United States. Aggressive pasture species where adapted, but can be serious

weed in lawns and cultivated crops. Not winter hardy; unadapted in Southeastern United States. Propagated vegetatively. Varieties not available.

### *Pennisetum purpureum* Schumach., napiergrass

Warm-season, slightly spreading bunchgrass introduced from Africa in 1913. Limited use for green feed, silage, and rotational grazing in Florida, gulf coast, and parts of Southwest. Coarse; forms large clumps. Must be cultivated to maintain high yield potential. Grows best in moist, fertile soil. Fair drought resistance; moderate frost resistance. Propagated vegetatively. Considerable variation among geographical races. In Hawaii, clonal varieties developed from selected seedlings.

#### MERKERON

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—F<sub>1</sub> hybrid between two selections carrying numbers 1 and 208.

*Method of Breeding.*—From 1936 to 1941 selection within open-pollinated seedling progenies of local types and introductions practiced. In fall of 1941 several of these selections hybridized to

combine desirable characteristics, including resistance to *Helminthosporium* eyespot. One of these crosses involving selection 1, vigorous common type, and selection 208, plant with very short internodes and many tillers, gave plants yielding 35 percent more than checks and best common napiergrass hybrids. In 1944 several of best of these hybrids sent to Río Piedras, Puerto Rico, for testing. Best of these—cross between selections 1 and 208—released under name “Merkeron” in 1955 by Velez Fortuno, head of plant breeding at Experiment Station, Río Piedras.

*Description.*—Leafy, many-tillered, late-maturing F<sub>1</sub> hybrid resistant to *Helminthosporium* eyespot.

*Released.*—1955, by Experiment Station, Río Piedras.

*Breeder Stock.*—Experiment Station, Río Piedras.

*Certified Stock.*—Not available. (Available commercially.)

***Pennisetum typhoides* (Burm.) Stapf and Hubbard, pearl millet (also *P. glaucum* (L.) R. Br.)**

Important warm-season annual from India and Africa, where grown primarily for grain. Used for pasture, soiling, and silage from Maryland to Florida and west to Texas. Well adapted in Coastal Plain. Grows best in moist, warm locations; grows on poor sandy soils; responds well to fertilizer. Highly nutritious and palatable. Good regrowth under proper management.

**GAHI 1 (Reg. No. 6)**

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—Commercial F<sub>1</sub> hybrid developed from four inbred lines selected from many lines isolated from common pearl millet, several introductions from Africa and India, and hybrids between them.

*Method of Breeding.*—Inbred lines isolated, stabilized, and tested for general and specific combining ability. Four of them, carrying numbers 13, 18, 23, and 26, chosen because they give good, high-yielding single crosses in all combinations; used to produce hybrid seed. F<sub>1</sub> seed produced by harvesting all open-pollinated seed from isolated field planted to mixture of equal numbers of live seeds of inbreds 13, 18, 23, and 26. This seed containing 65–75 percent of hybrids and 25–35 percent of selfs or sibs will perform as well as 100-percent hybrid seed when planted at rate of 10 pounds per acre in 30- to 36-inch rows. Increased for testing as Georgia Hybrid 1.

*Description.*—Leafier, later maturing, and more productive than common pearl millet. At Tifton yielded 50 percent more forage from May through September and over three times more after August 1 than common check. Recovery after grazing also much faster.

*Released.*—1958, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

*Certified Seed.*—Available in quantity.

**HYBRID SJ**

Selected by J. R. McNeill Seed Co., Spur, Tex.—J. R. McNeill and associates.

*Source.*—Single plant, diminutive, very sweet and juicy. At time this plant was found, unable to find any reference to sweetness in *Pennisetum glaucum* in literature. This plant occurred in material supplied by Substation 8, Lubbock, Tex., and was from Bureau of Plant Introduction (USDA) material, probably from India.

*Method of Breeding.*—This plant progeny crossed with numerous lines of common pearl millet, showing range of maturity, leafiness, yield potential, disease resistance, and drought tolerance. Selection 7 not used because of dominance for dry, nonsweet character. Eighty promising selections planted at Summerfield, Tex., under supervision of George C. Warner in 1954, and 20 further tested at Spur in 1955. That planting afforded opportunity for observation of chinch bug susceptibility, and three lines dropped. Further selections for freedom from leaf diseases made. Present seven inbred lines result of continuing selection, with production of two generations per year.

*Description.*—Mildly sweet in grazing and ensiling stage and juicy. Seed larger than common, not so large as Selection 7; seedling vigor good. Heads smaller than Selection 7; stalks not quite so tall, leafy, and free tillering.

*Released.*—Hybrid SJ made available to various research organizations in 1955. About 50,000 pounds of seed distributed commercially in 1957 from California to Florida and as far north as Iowa.

*Breeder Seed.*—J. R. McNeill Seed Co.

*Certified Seed.*—Not available. (In commercial production.)

**SELECTION 7**

Selected by J. R. McNeill Seed Co., Spur, Tex.—J. R. McNeill and associates.

*Source.*—Production field of common pearl millet; plant selection made by Elmer Edwards in 1948.

*Method of Breeding.*—Selected plants selfed in nursery. Next generations duplicated on dry land and land under supplemental irrigation.

*Description.*—Originally sold as Cattail Millet 7 and often listed as Texas 7. Tall, midleafy, mid-early; large, compact heads. Seed larger than average lots of common observed; germination and seedling vigor good. Well-developed heads have angled tip, character seen frequently in species.

*Released.*—No formal release made. Included in regional testing program. Variety produced and widely distributed since. No attempt made to get homozygous line because of high incidence of crossing and importance of hybrid vigor in open-pollinated *Pennisetum glaucum*.

*Breeder Seed.*—J. R. McNeill Seed Co.

*Certified Seed.*—Not available. (In commercial production.)

**STARR (Reg. No. 1)**

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—Developed as synthetic from material selected from common pearl millet and introductions carrying P.I. numbers 115055 and 115059. These introductions received from U.S.S.R. in 1936. P.I. 115055 originally from Tunisia, northern Africa, and P.I. 115059 from India.

*Method of Breeding.*—Broadleaved, highly palatable inbred line of common pearl millet crossed with broadleaved, short internode, leafy dwarf line in 1944. Selected F<sub>2</sub> plants carrying desired combination of characters tested and reselected in advanced selfed generations. Finally, best recombined in synthetic bearing name "Starr" in honor of Silas Starr, first director of Georgia Coastal Plain Experiment Station.

*Description.*—Broader leaves, shorter internodes and stems, and more leaves per stem than common pearl millet; matures 4–6 weeks later. In clipping tests produced about as much total dry matter as common, but produced much higher yields of leaves. Easier to manage under grazing, lasts longer, and produced more beef and milk under grazing than common type.

*Released.*—1951, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

*Certified Seed.*—Available in quantity.

### ***Phalaris arundinacea* L., reed canarygrass**

Cool-season, sod-forming grass indigenous to North America, Europe, and Asia. Locally important for hay, pasture, silage, and erosion control, especially in North Central States and on west coast from northern California to Washington, and to limited extent in northeastern, southern, and intermountain regions. Well adapted to poorly drained soils subject to flooding, but can be grown on drier upland soils.

#### **FRONTIER**

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Native collections.

*Method of Breeding.*—Three cycles of maternal line selection under controlled pollination.

*Description.*—Tall, leafy, somewhat later in maturity than common. Considered superior for fodder production because of leafiness and later maturity. Total yield capacity equal or superior to other known strains under Canadian conditions. Especially adapted to high-fertility soils with adequate moisture. Tested under designation Ottawa 1133-7.

*Released.*—1959, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Not available.

#### **IOREED**

Selected at Iowa Agricultural Experiment Station, Ames, SCS cooperating—H. D. Hughes and C. P. Wilsie.

*Source.*—Parental clones selected from German Steenacker 1; German Rodowbrooker 18; Oregon commercial; Minnesota J18, J15C, J15A, J20B; U.S. Department of Agriculture 55009 and 55018; and old Iowa strain 503.

*Method of Breeding.*—Ten clones from above sources selected on basis of forage, seed-yielding ability, and forage quality; saved and recombined. Iowa clone represented about one-third and other nine sources about 7 percent each of seed recombined to form Ioreed. Synthetic 1 seed first obtained in 1945.

*Description.*—Hardy, vigorous, moderately productive, with good leaf-disease resistance. Mid-early in maturity, fair in seed production, rather susceptible to seed shattering. Appears similar to commercial types from long-time stands in Iowa and Minnesota.

*Released.*—1946, cooperatively by Iowa Agricultural Experiment Station and Nursery Division, SCS.

*Breeder Seed.*—Iowa Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity.

#### **MANDAN 315**

Increased at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Field collection made near Waterloo, Mont., in 1936.

*Method of Breeding.*—Increase of above field collection. Planted in observational rows under dryland conditions at Mandan in 1937; most vigorous and most persistent of 10 reed canarygrass accessions grown in nursery until 1948. Vegetative material from original rows moved to new location in 1949 still persists. Seed from latter planting increased in 1956.

*Description.*—Vigorous, tall, free of leaf spot diseases at Mandan.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

**P-2369**

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—O. K. Hoglund, C. C. Sorenson, and H. W. Miller.

*Source.*—Selection from variety originally developed by J. H. Christ at Idaho Branch Station, Sandpoint. In 1934 planted along creek at Plant Materials Center, SCS, Pullman, Wash. Packet of seed, produced at Pullman, received at Pleasanton in 1949.

*Method of Breeding.*—Mass phenotypic selection from 10 space-planted clones representing 16 selected, open-pollinated, summer and winter active plants.

*Description.*—Summer and winter active (in Mediterranean climate); very robust. Glaucous culms to 6 feet; leaves abundant, soft, and lax. Poor seedling vigor. Seed production good; seed quality consistently high. Best adapted to wet lands and areas subject to spring and fall flooding.

*Released.*—No. Included in conservation plantings.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

**R.P. 200**

Selected at Rudy-Patrick Research Center, Ames, Iowa—R. R. Kalton and C. J. Nettles.

*Source.*—Clones selected from field collections of seed made in north-central region of United States and western Canada.

*Method of Breeding.*—Selections evaluated in clonal and progeny tests for stand establishment, vegetative vigor, recovery ability, leafiness, shattering resistance, freedom from disease, high germination capacity, and yield. Recombination of 10 elite clones; evaluated for agronomic merit in Iowa, Illinois, Kansas, and Minnesota.

*Description.*—Vigorous, productive, winter hardy, leafy, and disease and drought resistant. Good recovery. Few days later in maturity. Improved seed yield, seed quality, shattering resistance, and stand establishment in comparison with common seed sources.

*Released.*—Distributed for testing by Rudy-Patrick Seed Co. in 1962, 1963, and 1964.

*Breeder Seed.*—Rudy-Patrick Seed Co.

*Certified Seed.*—Not available. (Commercial seed available in 1965.)

**S-5573**

Selected at Canada Agriculture Research Station, Saskatoon, Saskatchewan—R. P. Knowles.

*Source.*—Single plant showing good seed retention in old stand at Saskatoon.

*Method of Breeding.*—Three cycles of mass selection from original lines for plants resistant to shattering. Synthetic of 10 plants formed to produce breeder seed.

*Description.*—Seed retention much superior to Frontier, Ioreed, and commercial. Vigor slightly inferior to above strains. Five percent of seeds yellow.

*Released.*—No. Included in regional tests.

*Breeder Seed.*—Canada Agriculture Research Station, Saskatoon.

**SUPERIOR**

Selected at Oregon Agricultural Experiment Station, Corvallis, ARS cooperating—H. A. Schoth.

*Source.*—Material growing on Oregon Agricultural Experiment Station farm.

*Method of Breeding.*—Single-plant selection made in 1926.

*Description.*—Comparatively nonshattering, large seeds; leafy, late maturing. Adapted to highland and fairly wet areas, but not resistant to long periods of inundation.

*Released.*—Cooperatively by Oregon Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Discontinued.

*Certified Seed.*—Not available. Looked promising in some tests. Strain used in grazing tests at Alabama Agricultural Experiment Station, Auburn, apparently traces to Superior.

***Phalaris coerulea* Desf., sunolgrass**

Increased at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

*Source.*—Increase of *Phalaris coerulea*, P.I. 111994, introduced from Australia in 1935.

*Method of Breeding.*—Tested at Pleasanton since 1936 and under range conditions at Sunol, Calif., since 1944.

*Description.*—Rapid-developing, long-lived bunchgrass, with strong seedling vigor. Best adapted to Grumusol soils in winter annual range area of California and southwestern Oregon, which receive 16 inches or more annual precipitation. Closely resembles hardinggrass in general appearance, but has three or more round, bulblike enlargements at base of stem rather than elongated



corm. Poor seed producer; florets drop from rachis as seed heads mature.

*Released.*—No. Included in regional testing program. Dropped from testing in California because of poor seed production, restricted range of

adaptation, and susceptibility to killing by overgrazing.

*Breeder Seed.*—Plant Materials Center, SCS, Corvallis, Oreg.

### ***Phalaris tuberosa* var. *hirtiglumis* Batt. and Trab., kolegrass**

Increased at California Agricultural Experiment Station, Davis—R. M. Love.

*Source.*—Introduction received from Agricultural Experiment Station, Rabat, Morocco, in 1955. California accession number T.O. 2143.

*Description.*—Coarse bunchgrass. Resembles hardinggrass in general appearance, but has round, bulblike enlargements at base of culm—somewhat similar to *Phalaris coerulescens*. Some indication it requires higher rainfall than hardinggrass.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—California Agricultural Experiment Station.

#### **PERLA**

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—H. W. Miller and O. K. Hoglund.

*Source.*—Introduced from Morocco. Received as *Phalaris tuberosa* var. *stenoptera* (P.I. 202480)

and assigned accession number P-14529. Later reidentified as *P. tuberosa* var. *hirtiglumis*.

*Method of Breeding.*—Increased under isolation with minor phenotypic selection to eliminate off-types.

*Description.*—Tall, robust, rapid-developing bunchgrass, with short rhizomes. Resembles hardinggrass in general appearance, but has much stronger seedling vigor and hairy glumes. Easy to establish, grows well during cold winter months, and produces good seed crops. Range livestock graze it readily. Adapted to soils with restricting layer in Mediterranean climatic zone wherever average annual rainfall is 16 inches or more. Indications that variety may be more drought tolerant than hardinggrass.

*Released.*—No. Included in field-evaluation program.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

### ***Phalaris tuberosa* var. *stenoptera* (Hack.) Hitchc., hardinggrass**

Cool-season, slightly-spreading grass from Union of South Africa; indigenous to northern Africa. Used for pasture and erosion control in California and sparingly in other parts of Southwest. Adapted to subtropical winter rainfall climate; best suited to heavy soils; drought resistant; palatable; withstands heavy grazing.

Increased at California Agricultural Experiment Station, Davis.

*Source.*—Introduced from Toowoomba Botanical Gardens, Australia, in 1914 by P. B. Kennedy, California Agricultural Experiment Station. Seed collected from old hardinggrass field at Hopland, Lake County, Calif., in 1940 by D. J. Vanderwal. This seed lot given accession number P-11740 and increased at Plant Materials Center, SCS, Pleasanton, Calif.

*Description.*—Long-lived, persistent, dryland, perennial bunchgrass, with intermediate winter growth. Short, stout rhizomes originating from base of low-lying crown; semibroad, blue-green leaves. High forage yields. Most widely adapted range grass used in California. Survives on rather infertile, stony soils, but yields best on heavy soils.

Adapted to zones of less than 15 inches of rainfall if clay layer in soil profile.

*Released.*—Certified by California Crop Improvement Association in 1946.

*Breeder Seed.*—Foundation seed available from California Crop Improvement Association.

*Certified Seed.*—Available in quantity.

#### **P-14893**

Selected at Plant Materials Center, SCS, Pleasanton, Calif.—O. K. Hoglund and C. C. Sorenson.

*Source.*—Introduced from Italy as P.I. 217441.

*Method of Breeding.*—Some phenotypic selection to eliminate offtypes.

*Description.*—Rapid-developing bunchgrass, with short, stout rhizomes. Stronger seedling vigor, fine stems and leaves, and more compact in growth than standard hardinggrass; may have higher quality forage. Appears to have same site and rainfall requirements as hardinggrass. Shorter stature makes seed harvesting easier.

*Released.*—No. Included in field-evaluation program.

*Breeder Seed.*—Plant Materials Center, SCS, Pleasanton.

***Phleum pratense* L., timothy**

Major cool-season bunchgrass from Europe. Used for hay, pasture, and silage throughout humid sections of Northern United States. Long-lived in cool, humid regions; winter hardy, but not resistant to close, continuous grazing. Palatable and nutritious; valuable hay grass. Poor recovery with limited moisture; does not tolerate drought or high temperatures.

**ASTRA**

Developed by Plant Breeding Institute, Weibullsholm, Landskrona, Sweden.

*Source.*—Indigenous plants.

*Method of Breeding.*—Mass selection. Large number of plants started under isolation. Undesirable plants rogued prior to anthesis. Seed harvested from remaining plants and bulked to form breeder seed.

*Description.*—Growth pattern similar to that of Climax; both varieties mature at same time. In Ontario average yield slightly below that of Climax under hay plus aftermath pasture management, but yield difference not statistically significant. Not as prominent flag leaf as Climax, which helps to distinguish variety in field. Good resistance to disease and winterkilling.

*Released.*—Plant Breeding Institute, Weibullsholm. Introduced into Canada by Ontario Seed Cleaners and Dealers, Ltd., Toronto.

*Breeder Seed.*—Plant Breeding Institute, Weibullsholm.

*Certified Seed.*—Available.

**CLAIR (Reg. No. 3)**

Increased at Kentucky Agricultural Experiment Station, Lexington—R. C. Buckner.

*Source.*—Naturalized strain growing on farm of Clair Andrew, Vevay, Ind.

*Method of Breeding.*—Comparative tests. Strain designated as "Vevay" in regional testing program.

*Description.*—Very early maturing strain, relatively coarse, vigorous, with good aftermath production.

*Released.*—1958, Kentucky Agricultural Experiment Station.

*Breeder Seed.*—Kentucky Agricultural Experiment Station.

*Certified Seed.*—Available.

**CLIMAX**

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Wide collection of seed lots.

*Method of Breeding.*—Synthetic variety developed by combining several progeny-tested clones.

*Description.*—Tall, fine stemmed. Characterized by marked leafiness; leaves carried high on stems. Under conditions of good fertility, aftermath growth excellent. Highly resistant to rust. Seven to ten days later in maturity than common.

*Released.*—1947, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available. (Seed produced in Canada and United States.)

**CORNELL 1777**

Selected at New York Agricultural Experiment Station, Ithaca.

*Description.*—Developed in 1908. More resistant to rust than Cornell 4059 or common timothy. Medium height, medium early, leafy, medium-fine stem. Retains green color when mature. High yields of forage and seed.

*Released.*—1922, by New York Agricultural Experiment Station.

*Breeder Seed.*—Discontinued.

**CORNELL 4059**

Selected at New York Agricultural Experiment Station, Ithaca.

*Description.*—One week later in maturity than common timothy. Tall, erect, coarse. Appeared to be adapted to coastal area of New England.

*Released.*—1922, by New York Agricultural Experiment Station.

*Breeder Seed.*—Discontinued.

**DRUMMOND**

Selected at Macdonald College, Quebec, Canada—J. N. Bird.

*Source.*—Strain from northern Europe, S-48 and S-51 from Wales, and F.C. 15150 from ARS and Ohio Agricultural Experiment Station, Wooster, all introduced during 1930-33.

*Method of Breeding.*—Maternal line selection, with space-planted progeny tests.

*Description.*—Reaches flowering and seed stage about 10-14 days later than common timothy at Macdonald College. Winter hardy, with appreciable amount of rust resistance.

*Released.*—Department of Agronomy, Macdonald College.

*Breeder Seed.*—Department of Agronomy, Macdonald College. Hogg and Lytle, Ltd., Oakwood, Ontario, have exclusive rights to breeder seed.

*Certified Seed.*—Available in limited quantity in 1964.

### DURAL

Selected at University of Manitoba, Winnipeg, Canada.

*Source.*—Parent material obtained from New York Agricultural Experiment Station, Ithaca, and from Ontario College of Agriculture, Guelph, Ontario, Canada.

*Description.*—Selected for yield, leafiness, and resistance to rust. Winter hardy; well adapted to more humid areas of Manitoba. Medium in maturity.

*Released.*—University of Manitoba.

*Breeder Seed.*—University of Manitoba.

*Certified Seed.*—Available in limited quantity.

### ESSEX (Reg. No. 2)

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy and S. S. Atwood.

*Source.*—Wide collection of seed lots from plant breeders in United States. Parental clones: N.Y. 48-30, N.Y. 48-140, N.Y. 48-154, and N.Y. 48-215.

*Method of Breeding.*—Synthetic variety developed from four selected clones. Breeder seed produced in isolated plot from randomly planted vegetative pieces of four clones in 100 or more replications. Equal amounts of seed from each parental clone mixed together for breeder seed. Certified seed first advanced generation from foundation seed; not eligible for use as planting stock for production of any class of certified seed.

*Description.*—Very late maturing, leafy. Yielded 97 percent as much as common and Climax when tested alone, 94 percent when tested with alfalfa, and 93 percent when tested with Empire birdsfoot trefoil. Approximately 2 weeks later in maturity than common and 10 days later than Climax. Forage at first harvest nearly always leafier and freer of foliar diseases than common, Climax, and other earlier maturing types. In limited tests for seed production similar to common and lower than Climax in yield.

*Released.*—1955, by New York Agricultural Experiment Station.

*Breeder Seed.*—New York Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### HOPKINS

Selected at Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

*Source.*—Collections from old meadows and roadsides.

*Method of Breeding.*—(See Marietta.) Composed of selections F.C. 28119 and F.C. 28152.

*Description.*—In northern Ohio approximately 14 to 15 days later than common timothy.

*Released.*—1946, cooperatively by Ohio Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Discontinued.

### HURON

Selected at North Ridgeville, Ohio, and Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

*Source.*—Plant selected along roadside about 4½ miles west of Wakeman, Huron County, Ohio, in 1911.

*Method of Breeding.*—(See Marietta.) Evaluated as F.C. 3937.

*Description.*—Late variety; about 6 days later blooming and maturing seed than common timothy.

*Released.*—Cooperatively by Ohio Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Discontinued.

### ITASCA (Reg. No. 1)

Selected at Minnesota Agricultural Experiment Station, St. Paul.

*Source.*—See Method of Breeding.

*Method of Breeding.*—Composed of seven inbred lines from following sources: One from Minnesota commercial seed, one from T7, two from Cornell 1620, and three from Cornell 1777. Synthetic tested as Minnesota 1630.

*Description.*—Rank growing; well adapted to conditions in Minnesota. Similar to commercial timothy in maturity, but superior in growth character and habit.

*Released.*—Minnesota Agricultural Experiment Station.

*Breeder Seed.*—Minnesota Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity.

### LORAIN

Selected at Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

*Source.*—Collections from old meadows and roadsides.

*Method of Breeding.*—(See Marietta.) Composed of selections F.C. 15167 and F.C. 28147.

*Description.*—In northern Ohio approximately 10-12 days later than common timothy. Leaves remain green for about 8-10 days longer than those of common. Adapted for hay production in northern Ohio.

*Released.*—1939, cooperatively by Ohio Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Discontinued.

*Certified Seed.*—Not available. (Some commercial supplies.)

### MARIETTA

Selected at Ohio Agricultural Experiment Station, Wooster, ARS cooperating—M. W. Evans.

*Source.*—Collections from meadows and roadsides.

*Method of Breeding.*—Selection practiced in space-planted nurseries. Plots arranged in blocks of selections having same time of heading, blooming, and maturity. Progeny tested in space-planted row plots in successive generations. Composed of selections F.C. 11901, 12468, and 15220. In 1946 selections changed to F.C. 11901, F.C. 28096, and F.C. 28185. Leaves of last two selections remain green longer than those of F.C. 12468 and F.C. 15220.

*Description.*—Blooms and matures in northern Ohio approximately 5 days earlier than common timothy. Leaves tend to remain green nearly as late as those of common timothy. Well adapted to southern Ohio.

*Released.*—1937, cooperatively by Ohio Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Discontinued.

### MEDON

Selected at Ontario College of Agriculture, Guelph, Ontario, Canada—O. M. McConkey.

*Source.*—Local collections and introductions from Scandinavia, U.S.S.R., central Europe, Great Britain, and United States.

*Description.*—Leafy, winter hardy, well adapted in Ontario.

*Released.*—Ontario College of Agriculture.

*Breeder Seed.*—Ontario College of Agriculture.

*Certified Seed.*—Available in limited quantity.

### MILTON

Selected at Macdonald College, Quebec, Canada—J. N. Bird.

*Source.*—Strains obtained from New York Agricultural Experiment Station, Ithaca, Minnesota Agricultural Experiment Station, St. Paul, and Svalof Experiment Station, Sweden; commercial seed from Dickinson Seed Co., Chicago, Ill., in 1911.

*Method of Breeding.*—Fairly rust resistant in comparisons made with inoculated plants at Macdonald College, whereas ordinary commercial strains susceptible to timothy rust. Winter hardy, early maturing, vigorous.

*Released.*—Macdonald College.

*Breeder Seed.*—Macdonald College.

*Certified Seed.*—Not available.

### NEW YORK SYNTHETIC B

Selected at New York Agricultural Experiment Station, Ithaca—R. P. Murphy and S. S. Atwood.

*Source.*—Wide collection of seed lots from plant breeders in United States. Parental clones: N.Y. 48-11, N.Y. 48-56, N.Y. 48-102, N.Y. 48-103, and N.Y. 48-110.

*Method of Breeding.*—Synthetic variety developed from five selected clones. First- and second-generation seed produced as for Essex.

*Description.*—Medium to late maturing; leafy. Similar to Climax in performance, except it has wider leaves and approximately 3 days later in maturity.

*Released.*—No.

*Breeder Seed.*—New York Agricultural Experiment Station.

### SHELBY

Early-maturing farmer's strain grown and used in southern Indiana.

*Certified Seed.*—Not available.

### SWALLOW

Selected at University of Alberta, Edmonton, Canada.

*Source.*—Late Swedish stock Svalof 523 introduced into Alberta in 1918.

*Description.*—Hay type. Similar to common timothy in appearance, but with good stem rust resistance (Edmonton), and winter hardiness.

*Released.*—University of Alberta.

*Breeder Seed.*—University of Alberta.

*Certified Seed.*—Available in limited quantity.

### WISCONSIN T-1

Selected at Wisconsin Agricultural Experiment Station, Madison, ARS cooperating—E. L. Nielsen and P. N. Drolsom.

*Source.*—Collection of named varieties and introduced seed lots.

*Method of Breeding.*—Open pollination of 81 selected clones from diverse sources. Field selections made in spaced progenies. Artificially screened for stem rust. Synthetic based upon 28 clones selected for stem rust and leaf streak tolerance, late maturity, leafiness, vigor, seed production, and stiff straw.

*Description.*—Late-maturing hay type. Moderately coarse, good tolerance to stem rust and leaf streak, vigorous, stiff strawed.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Wisconsin Agricultural Experiment Station.

***Poa ampla* Merr., big bluegrass**

Cool-season, native bunchgrass. Valuable in Pacific Northwest and throughout northern part of intermountain region. Very early, relatively coarse, palatable. Damaged by overgrazing; drought resistant.

**SHERMAN**

Selected at Plant Materials Center, SCS, Pullman, Wash.—V. B. Hawk, J. L. Schwendiman, and A. L. Hafenrichter.

*Source*.—Collected from native vegetation near Moro, Sherman County, Oreg., by D. E. Stephens, superintendent of Sherman Branch Experiment Station, Moro, in 1932. Re-collected by SCS in 1935; tested as P-2716 against 177 other accessions.

*Method of Breeding*.—Mass selection for several generations.

*Description*.—Starts growth very early in spring. Productive, early maturing, 35–38 inches tall, erect growing, fine stemmed. Long-lived perennial bunchgrass; high in seed, forage, and root production. Distinct blue, moderately abundant leaves; large, compact seed head. Plants apomictic. ( $2n=63$ .) Adapted to conservation seedings alone or with alfalfa in dryland areas in wheat-fallow farmland on light-textured soils. Successfully used for reseeding burned-over forest lands in pine zones of Western States.

*Released*.—1945, cooperatively by Washington, Idaho, and Oregon Agricultural Experiment Stations at Pullman, Moscow, and Corvallis, respectively, and Plant Materials Center, SCS, Pullman. Distributed for field tests in 1938.

*Breeder Seed*.—Plant Materials Center, SCS, Pullman.

*Certified Seed*.—Available in quantity.

***Poa annua* L., annual bluegrass**

Cool-season, annual bunchgrass from Europe. Serious weed in lawns and golf courses; tolerates close mowing and produces seed under regular mowing at height of one-fourth inch. Under cool

conditions volunteer stands may provide good- to fair-quality turf. Not recommended, but may be encouraged to provide fall and spring cover on bermudagrass fairways. Varieties not available.

***Poa arida* Vasey, plains bluegrass****RENO**

Increased at Plant Materials Center, SCS, Manhattan, Kans.—M. D. Atkins.

*Source*.—From field seed collection made in 1951 on poorly drained, high water table, saline grassland near Hutchinson, Reno County, Kans. Increased for testing as KG-2188.

*Description*.—Leafy, vigorous ecotype for use in

grass mixtures for establishing permanent vegetation on high water table, saline and alkaline sites in central and western Kansas. Medium seed production.

*Released*.—Informally by SCS in 1956 for field-evaluation plantings.

*Breeder Seed*.—Plant Materials Center, SCS, Manhattan.

*Certified Seed*.—Not available.

***Poa bulbosa* L., bulbous bluegrass**

Cool-season bunchgrass from Europe. Used for pasture and erosion control in parts of Western United States, including southwestern Idaho, Oregon, and northern California. Increased from bulblets that form in panicle.

**P-4874**

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source*.—Pullman, east on Highway 3 near Idaho State line. Collected in 1937 by J. L. Schwendiman from naturalized stand.

*Method of Breeding*.—Bulk selections from open-pollinated planting of original collection. Tested against commercial and other naturalized strains.

*Description*.—Vigorous, robust, leafy, tall growing, productive, late maturing. Heavy forage and seed producer. Short-lived perennial. Reseeds readily; seed high in germination. Adapted for use as understory grass in range seedings of crested wheatgrass or other dryland grasses at elevations of less than 4,000 feet, where it provides good ground cover.

*Released.*—1956, cooperatively by Idaho Agricultural Experiment Station, Moscow, and Plant Materials Center, SCS, Pullman.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Not available.

### ***Poa compressa* L., Canada bluegrass**

Cool-season, sod-forming grass from Europe. Used for pasture and erosion control in humid parts of Northern United States. Adapted to

open, rather poor, dry soils, but does not withstand heavy grazing. Less desirable than Kentucky bluegrass for turf. Varieties not available.

### ***Poa fendleriana* Nannf., mutton bluegrass**

Cool-season, native bunchgrass. Widely distributed in intermountain region, extending south to high-elevation rangelands of Arizona and New

Mexico. Palatable and nutritious; provides early grazing. Adapted to wide range of soil types; drought resistant. Varieties not available.

### ***Poa glauantha* Gaudin, upland bluegrass**

Cool-season bunchgrass. Found from eastern Canada to Pacific Northwest and in Europe. Shows some promise for erosion control and general-purpose turf in Pacific Northwest.

*Description.*—Numerous compressed, fine, wiry culms; decumbent at base. Many flat, short, dark-green leaves; well distributed. Seed heads numerous, lax, becoming brownish, compact, and nodding at maturity. Seeds small; lemmas lightly pubescent and sparsely webbed at base. Plants resemble Canada bluegrass, but become sodbound less readily, lodge less, and produce more seed. Adapted to low-fertility soils for ground cover.

#### **DRAYLAR (Reg. No. 3)**

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman.

*Source.*—Introduced as *Poa* spp., P.I. 109350, in 1935 by Westover-Enlow expedition from Chorsum, Turkey. Tested and propagated as P-410.

*Released.*—1951, cooperatively by Washington Agricultural Experiment Station and Plant Materials Center, SCS, Pullman. Named Draylar in 1963.

*Method of Breeding.*—Aberrant plants removed from original introduction and remaining apomictic ( $2n=50$ ) plants increased.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman.

*Certified Seed.*—Not available.

### ***Poa pratensis* L., Kentucky bluegrass**

Major cool-season, sod-forming grass from Europe. Extensively used for pasture, recreational turf, and erosion control in Northeastern and North Central States and southward in Appalachians to northern Georgia. Important lawn grass in Pacific Northwest and throughout much of northern and central Great Plains and intermountain region. Best adapted to well-drained, productive soils of limestone origin.

#### **BELTSVILLE 117-27(6)**

Selected at Plant Industry Station, Beltsville, Md.—A. A. Hanson and F. V. Juska.

*Source.*—Irradiated Merion Kentucky bluegrass.

*Method of Breeding.*—Single aberrant plant selected in  $M_3$  generation from  $M_2$  mutant.

*Description.*—Prostrate growth habit, dark green. Fair to good seed yield at Beltsville. Level of apomixis estimated at 80 percent. Good tolerance to leaf spot and rust.

*Released.*—No. Distributed for testing in 1964.

*Breeder Seed.*—Plant Industry Station.

#### **ARBORETUM**

Selected at Missouri Botanical Garden, St. Louis—W. L. Brown.

*Source.*—Collections of plants from old pastures and lawns in Missouri and neighboring States.

*Released.*—Informally. Included in several turf tests; not outstanding in most tests.

*Certified Seed.*—Not available. (Limited commercial increase in Pacific Northwest.)

#### **BELTURF**

Selected at Plant Industry Station, Beltsville, Md.—A. A. Hanson and F. V. Juska.

*Source.*—Field collections in Maryland and Alabama. Traces to vegetative collection from old management experiment at Plant Industry Station.

*Method of Breeding.*—Vegetative collections separated into six individual tillers and space planted for seed production and for elimination of contaminants. Seed harvested and used to establish unreplicated solid-seeded plots and space-planted progeny test. Promising selections included in replicated plot test for evaluation under two levels of nitrogen. Selected and evaluated as S-5.

*Description.*—Vigorous, semiprostrate type; excellent rhizome development and spread. Fair seed yield at Beltsville; highly apomictic. High tolerance to leaf spot and rust. Distinguished from Merion by medium-green color and narrower leaves.

*Released.*—No. Distributed for testing in 1964.

*Breeder Seed.*—Plant Industry Station.

#### DELTA

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Native material.

*Method of Breeding.*—Single-plant selection.

*Description.*—Vigorous, erect, fine stemmed, relatively early, apomictic. Adapted to cooler sections of Kentucky bluegrass region, where leaf spot infestations to which it is susceptible are less frequent. Marked resistance to mildew.

*Released.*—1938, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Available. (Some production in Pacific Northwest.)

#### K5(47)

Selected at Pennsylvania Agricultural Experiment Station, University Park—J. M. Duich and H. B. Musser.

*Source.*—Field collections and accessions received from other experiment stations.

*Method of Breeding.*—Space-planted progeny tests and evaluation in sod plots.

*Description.*—Dark green; similar to Merion in general appearance. Resistant to leaf spot and some resistance to other diseases. Seed yields disappointing in Pacific Northwest.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—Pennsylvania Agricultural Experiment Station.

#### MERION (Reg. No. 1)

Selected at Plant Industry Station, Beltsville, Md., by U.S. Golf Association Green Section, ARS cooperating—Fred V. Grau.

*Source.*—Single-plant selection made by Joseph Valentine of Merion Golf Club, Ardmore, Pa., in 1936 and increased by John Monteith, Jr., former director, U.S. Golf Association Green Section.

*Method of Breeding.*—Plant selection and apomictic seed progenies obtained through succeeding generations tested in cooperative turf research program of Crops Research Division, ARS, and U.S. Golf Association Green Section. Tested as B-27.

*Description.*—Low growing, short leaves, good color. High degree of resistance to *Helminthosporium* leaf spot. More tolerant to close mowing than common Kentucky bluegrass. Susceptible to rust.

*Released.*—1947, cooperatively by Crops Research Division, ARS, and U.S. Golf Association Green Section.

*Breeder Seed.*—Pennsylvania Agricultural Experiment Station, University Park.

*Certified Seed.*—Available in quantity.

#### NEWPORT (Reg. No. 2)

Selected at Plant Materials Center, SCS, Pullman, Wash.—Jens Clausen, Carnegie Institution of Washington, Stanford University, Stanford, Calif., and Plant Materials Center staff.

*Source.*—Maritime race collected from coastal bluffs at Newport, Lincoln County, Oreg., by W. E. Lawrence. Propagated under Carnegie Institution of Washington, accessions CIW 4466-1 and P-13821.

*Method of Breeding.*—Seed of original collection used to establish spaced planting in 1949. Strain found apomictic ( $2n=81$ ); bulked seed used for increase in 1953. This strain used in Carnegie Institution of Washington hybrid bluegrass studies.

*Description.*—Vigorous, highly productive, coastal race of broad climatic tolerance. Wide, dark-green leaves, low growing, fair to good in seed production, medium late in seed maturity, rapid sod forming. Appears to be fairly resistant to rust and *Helminthosporium* leaf spot.

*Released.*—1958, cooperatively by Washington and Oregon Agricultural Experiment Stations at Pullman and Corvallis, respectively, and Plant Materials Center, SCS, Pullman.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman, and Washington Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

**NU DWARF**

Selected by Ross H. Rasmussen, Hooper, Nebr.  
*Source.*—Field collection.

*Method of Breeding.*—Increase of original collection.

*Description.*—Dwarf type. Short seed heads with distinct purplish color at blooming stage. Aggressive in area of adaptation.

*Released.*—By Ross H. Rasmussen.

*Breeder Seed.*—Ross H. Rasmussen.

*Certified Seed.*—Not available. (Some commercial supplies.)

**P-4358**

Selected at Plant Materials Center, SCS, Pullman, Wash.—J. L. Schwendiman and I. R. Adlard.

*Source.*—From Professor Frandsen, Denmark, as F.C. 22190 in 1934.

*Method of Breeding.*—Propagated through four generations to eliminate aberrant plants. Space planted in 1952; 14 single-plant selections made in 1953. Seed from four outstanding plant selections space planted. Aberrant plants removed; bulked seed of each selection used for further testing in turf tests of Agronomy Department of Washington Agricultural Experiment Station, Pullman.

*Description.*—Dwarf, low growing; short, dark-green leaves. Similar to Merion, but 10–14 days later in seed maturity. Produces very few aberrant plants. Resistant to powdery mildew and leaf and stem rusts.

*Released.*—No. Increased for testing.

*Breeder Seed.*—Plant Materials Center, SCS, Pullman, and Washington Agricultural Experiment Station.

**PARK**

Selected at Minnesota Agricultural Experiment Station, St. Paul—H. L. Thomas, Herman Shultz, A. R. Schmid, and H. K. Hayes.

*Source.*—Vegetative material collected from 60 old pastures and waste places throughout Minnesota in 1937.

*Method of Breeding.*—Collections separated into 281 vigorous individual plants; carried through extensive selection and testing program until 1947. Eighteen strains selected for further testing; in 1953 mixture of 15 best apomictic strains increased for testing as Minnesota 95.

*Description.*—In Minnesota described as being superior to Merion in seedling and plant vigor, resistance to rust, and sod formation.

*Released.*—1957, by Minnesota Agricultural Experiment Station.

*Breeder Seed.*—Minnesota Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

**PRATO**

Developed by D. J. van der Have, Kapelle-Biezeling, Netherlands—D. J. Glas.

*Source.*—Collection of plants from eastern Holland.

*Method of Breeding.*—Plants selected for strong rhizome growth and other characteristics over 3-year period. Seed from superior plants used to establish turf tests. Under short mowing, three plants proved to be superior in turf density, texture, and tolerance to *Helminthosporium vagans* and dry soil conditions.

*Description.*—Produces dense turf due to prolific tillering and above-average number of leaves per tiller. Under turf conditions, leaves medium narrow, with lower leaves tending to be prostrate. Slightly lighter green than common. Individual plants very leafy, with medium-wide, rather short leaves. Moderately resistant to *Helminthosporium* spp. and some tolerance to rust. Maturity slightly later than common.

*Released.*—Holland, 1959, by D. J. van der Have; United States, 1964, by Northrup, King & Co.

*Breeder Seed.*—D. J. van der Have.

*Certified Seed.*—Available under OECD scheme.

**TROY**

Selected at Montana Agricultural Experiment Station, Bozeman, ARS cooperating—R. E. Stitt.

*Source.*—Increase of P.I. 119684. Introduced from Turkey by Westover-Wellman expedition in 1936.

*Description.*—Vigorous pasture strain. Released for use in irrigated pastures in Montana. Tall, erect-growth habit, good recovery, open sod. Not outstanding with respect to disease resistance. Adapted to cooler parts of Kentucky bluegrass region. Early maturing; ready to graze at Bozeman 10–14 days before other strains.

*Released.*—1955, cooperatively by Montana Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Montana Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity.

**WINDSOR**

Selected at Research Division, O. M. Scott & Sons Co., Marysville, Union County, Ohio—V. A. Renner.

*Source.*—Collected in 1949 from grazed pasture area near Marysville by V. A. Renner.



*Method of Breeding.*—Single-plant selection made from original collection; progeny tested through successive generations. Selection found to be facultative apomict, with  $2n=86$ . Tested under code number S-2 at Salem, Oreg., Hayward and Pasadena, Calif., Long Island, N.Y., and Marysville, Ohio.

*Description.*—Produces very dense turf cover when maintained under mowing height from three-fourths to over 2 inches. Leaf texture slightly finer than Merion. Clipping measurements over 2-year period show Windsor produces less vertical growth than common, Delta, and Park. Moderate

to high resistance to *Helminthosporium* leaf spot and rust. Performs well under high summer temperatures and low soil-moisture levels.

*Released.*—1962, as component in O. M. Scott & Sons Co., proprietary bluegrass lawn-seed mixtures. Original Windsor clone patented in 1963; patent protection does not apply to seed.

*Breeder Seed.*—Controlled by O. M. Scott & Sons Co.

*Certified Seed.*—Not available. (Commercial production under contract between selected growers and O. M. Scott & Sons Co.)

### ***Poa secunda* Presl, Sandberg bluegrass**

Cool-season, native bunchgrass distributed throughout intermountain region. Valuable for early-spring grazing; foliage cured on stem, fairly

palatable. Grows on wide range of soil types; deep rooted, drought resistant, and persistent. Varieties not available.

### ***Poa trivialis* L., rough bluegrass**

Cool-season, sod-forming grass from Europe. Distributed in Northern United States. Limited use in lawn mixtures for shady areas. Does best

in cool, moist environment; dormant during mid-summer; not adapted on dry sites. Varieties not available.

### ***Setaria italica* (L.) Beauv., foxtail millet**

Warm-season annual from Asia. Used for late sown hay in Great Plains and to limited extent for birdseed and pasture. Grows best under warm conditions; not drought resistant. Largely replaced by sudangrass and early-maturing sorghums for temporary pasture and emergency forage. Many varieties developed when crop was popular, including common, German, Golden Wonder, Goldmine, Hungarian, Siberian, Kursk, and Turkestan.

*Description.*—Tall, leafy, high yielding, late maturity. Seeds golden, tending toward roundness. May be identified readily by high percentage of bifurcate inflorescences; this bifurcate character dominant, but degree of expression depends to considerable extent on environmental conditions. In Canada outyielded most, if not all, commercial millets in same maturity group.

*Released.*—1937, Canada Department of Agriculture.

*Breeder Seed.*—Genetics and Plant Breeding Research Institute, Central Experimental Farm, Ottawa.

*Certified Seed.*—Not available. (Some commercial production in Ontario.)

#### **EMPIRE**

Selected at Central Experimental Farm, Ottawa, Ontario, Canada—R. M. MacVicar.

*Source.*—Manchurian material.

*Method of Breeding.*—Synthetic variety developed by combining selected lines of similar type.

### ***Sorghastrum nutans* (L.) Nash, indiagrass**

Warm-season, native bunchgrass. Distributed throughout Eastern United States and west to North Dakota, Colorado, and Arizona. Valuable range grass in central and southern Great Plains. Does best on fertile bottom lands, but also grows on sandy soils. Palatable early in season, but only fair for winter use; damaged by overgrazing.

#### **CHEYENNE**

Selected at SCS Nursery, Woodward, Okla.—James E. Smith, Jr., and G. L. Powers.

*Source.*—Native rangeland near Supply, Okla., 1942.

*Method of Breeding.*—Increase of bulk collection at Cheyenne, Okla., until 1951, then at Tex-

line, Tex. Only one seed crop grown by SCS at this location.

*Description.*—Heterogeneous plant makeup. Good forage type, good seed producer, adapted for range and pasture in western Oklahoma and in Texas.

*Released.*—Informally by SCS in 1945, but field established by Max Bower in 1954 at Morton, Tex., believed to be first planting made for commercial seed production.

*Breeder Seed.*—Not available.

*Certified Seed.*—Not available. (In commercial production.)

### HOLT

Developed at Nebraska Agricultural Experiment Station, Lincoln, ARS cooperating—E. C. Conard and L. C. Newell.

*Source.*—Collections in Elkhorn Valley of Holt County in northeastern Nebraska.

*Method of Breeding.*—Mass selection for type. Grown at Lincoln since 1942.

*Description.*—Moderately early maturing; superior in leafiness and yield to early maturing strains from northern and western sandhill region of Nebraska. Relatively finer leaves and stems than later maturing varieties from more southerly sources, which may produce more total forage. Well suited for revegetation either in pure stands or in mixture with other relatively early maturing, tall, warm-season grasses, such as Nebraska 28 switchgrass and sandhill bluestems. May also be grown in diverse mixtures containing such midtall grasses as Butte sideoats grama and Nebraska 27 sand lovegrass. Should be grown in irrigated rows for seed production and will mature seed crops in such relatively short seasons as those of western or northern Nebraska.

*Released.*—1960, cooperatively by Nebraska Agricultural Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Nebraska Agricultural Experiment Station.

*Certified Seed.*—Available.

### KANSAS EXPERIMENTAL

Selected at Kansas Agricultural Experiment Station, Manhattan.

*Source.*—Collections made in Oklahoma and southern Kansas in 1953.

*Method of Breeding.*—Selected in 1955 from accessions space planted in 1954. Fifty plants selected after two seasons of observation (1954 and 1955) in evaluation nursery of several thousand individuals. Major criteria for selection—leafiness, vigor (large size), freedom from rust, and, since species tends to mature late, earliness of maturity. Propagated clonally in five-replication

randomized crossing block in 1956. Seed produced by this block in 1956 planted in 36-inch rows in 1957 for further increase. Planned that this may serve temporarily as variety until plant breeders can make further improvement.

*Description.*—Tall, leafy, vigorous, mostly free of rust, medium to late maturity.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—Kansas Agricultural Experiment Station.

### LLANO

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collected in 1956 and 1957 from sandy plains sites in eastern New Mexico, one near Hudson and other near Portales, at elevation of 4,000–4,100 feet and average annual precipitation of 16–17 inches.

*Method of Breeding.*—Increased separately, but combined in equal parts to produce heterogeneous second generation. In comparison-row planting and in initial increase, growth, flowering, and seeding characteristics of two collections were similar. Increased and tested as PM-NM-275.

*Description.*—Fairly uniform, with good leaf production extending well up culms. Under irrigation and fertilization, plants mature at 5–6 feet, yielding high-quality seed in excess of 400 pounds per acre. Adapted to range and pasture seeding on sandy sites in southwestern Great Plains, where rainfall is erratic and relatively low. Performed well in eastern New Mexico and east-central and southeastern Colorado, but needs adequate testing farther north and east.

*Released.*—1963, by New Mexico Agricultural Experiment Station and Plant Materials Center, SCS, Los Lunas.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

*Certified Seed.*—Not available.

### M2-10302

Selected at SCS Nursery, Ames, Iowa—M. E. Heath and A. I. Alcott.

*Source.*—Bulk collection of seed made along railroad right-of-way south of Ames in 1939.

*Method of Breeding.*—Seed collected in 1939 increased under isolation for several generations at SCS Nurseries, Ames and Ankeny, Iowa.

*Description.*—Representative ecotype of central Iowa. Uniform, vigorous, with high seed yields.

*Released.*—No. Tested in observational plantings by SCS from 1941 to 1949.

*Breeder Seed.*—Small quantity maintained by Plant Materials Center, SCS, Elsberry, Mo.

## NEBRASKA 54

Increased by private seed producer, Harold Hummel, Fairbury, Nebr.

*Source.*—Seed collected in 1954 by H. Hummel from selected native plants growing along railroad right-of-way and in native ranges in southern part of Jefferson County, Nebr.

*Method of Breeding.*—Placed directly in seed production.

*Description.*—Tall, leafy, moderate late maturing indiangrass. Can produce high seed yields. Good seedling vigor. Well adapted in southern and eastern Nebraska and in northern Kansas.

*Released.*—1957; certified as to origin by Nebraska Crop Improvement Association.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity.

## TEJAS

Selected at Texas Research Foundation, Renner—E. O. Gangstad.

*Source.*—Collections from Texas, Oklahoma, and New Mexico in 1954.

*Method of Breeding.*—Selected for leafiness, forage yield, and seed yield in polycross nurseries planted in 1955, 1957, and 1959. In 1962, 10 highest yielding clones bulk planted and increased as experimental synthetic variety Tejas.

*Description.*—Relatively uniform plant size; robust, vigorous, dark blue-green plant. Lemon-yellow seed head, with dark awned seeds. Flowers in mid-October at Renner.

*Released.*—No.

*Breeder Seed.*—Texas Research Foundation.

***Sorghum halepense* (L.) Pers., johnsongrass**

Important warm-season, sod-forming grass introduced from Turkey in about 1830. Serious weed throughout much of Southern United States and as far north as southern Illinois and Indiana. Palatable and nutritious for hay and pasture on fertile soils from Alabama to Texas; damaged by heavy grazing or frequent cutting; root binding corrected by renovation and adequate fertilizer.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Mississippi Agricultural Experiment Station.

**MISSISSIPPI PERSISTENT**

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

*Source.*—Large number of field collections.

*Method of Breeding.*—Selection made on number of culms produced from seed first season (above 60); further selection made on degree of clipping and palatability.

*Description.*—Produces 80–120 culms per plant, up to 5 feet tall, 1/8–1/4 inch in diameter. Rather compact base with very slowly spreading rhizomes. Persistent under mowing; withstood six clippings for 2 years. Only self-fertile plant in large number handled.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Mississippi Agricultural Experiment Station.

**MISSISSIPPI FINE STEM**

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

*Source.*—Large number of field collections.

*Method of Breeding.*—Selection made on number of culms produced from seed first season (above 60); further selection made on degree of clipping and palatability.

*Description.*—Produces 130–180 culms per plant, 2–4 feet tall, 1/32–1/8 inch in diameter; largest culm never gets as large as minimum allowed in grade 1 hay. Very leafy. Relatively low seed production. Has been used as source material in breeding program.

***Sorghum halepense* × *S. vulgare* (including *S. halepense* × *S. sudanense* and *S. alnum* Parodi), sorgrass**

**DE SOTO**

Selected at Texas Research Foundation, Renner—E. O. Gangstad.

*Source.*—Introductions.

*Method of Breeding.*—Seed progeny of 4n grass sorghum, including *Sorghum alnum*, *S. sudanense* and *S. arundinaceum* planted in polycross nurseries in 1958, 1959, and 1960 and selected for

persistence, high seed and forage yields, palatability, and low prussic acid potential. Most satisfactory strain increased in 1961, 1962, and 1963.

*Description.*—Vigorous growing, intermediate-sized plants. Broad flat leaves, large open panicle, and short terminal rhizomes. Plant somewhat larger than johnsongrass, but slightly smaller than most selections of *S. alnum*.

*Released.*—No. Included in field plantings.

*Breeder Seed.*—Texas Research Foundation.

### MISSISSIPPI ISJ

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

*Source.*—Collections of Hodo sorgo and johnsongrass.

*Method of Breeding.*—Cross made by pollinating hot-water emasculated (42° C. for 10 minutes) Hodo sorgo florets with red-stigma johnsongrass. Selfing started in F<sub>1</sub> and has been continued. Spaced F<sub>2</sub> plants left where set for growth-habit studies. Perennial (75 percent) plants grazed by cattle. Cattle consistently grazed types containing juice regardless of stem size. Five percent of selectively grazed population selfed; progeny selected for juiciness by hand twisting and for nonspreading rhizomes.

*Description.*—Selection from F<sub>6</sub> made on basis of plant size intermediate between sorgo and johnsongrass. Produces 20–40 culms per plant, 9–12 feet tall, 1/3–1/2 inch in diameter. Arise from very slowly spreading rhizomes. Produces two cuttings per year. Total carbohydrate content of 10–14 percent. Seed set approximately 50 percent. Produces extremely well under irrigation and fertilization.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Mississippi Agricultural Experiment Station.

### MISSISSIPPI SJ-1

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

*Source.*—Collection of Hodo sorgo and johnsongrass.

*Method of Breeding.*—Similar to Mississippi ISJ.

*Description.*—F<sub>6</sub> segregate. Selection made on basis of large leaves and sweet stems. Produces 25–65 culms per plant, 3 1/2–7 feet tall, 3/16–7/16 inch in diameter. Too large and juicy for hay, but makes good grazing and leafy silage. Seed production extremely low. May be cut at least twice per season.

*Released.*—No. Included in regional testing program. Dropped because of low seed production. Used in new hybrids and backcrosses.

*Breeder Seed.*—Clones maintained at Mississippi Agricultural Experiment Station.

### MISSISSIPPI SJ-2

Selected at Mississippi Agricultural Experiment Station, State College, ARS cooperating—H. W. Bennett.

*Source.*—Collection of Hodo sorgo and johnsongrass.

*Method of Breeding.*—Similar to Mississippi ISJ.

*Description.*—Selection from F<sub>6</sub> made on basis of grass-type habit and carbohydrate content. Very leafy; 14-percent total carbohydrate content in 50-percent dry-matter plant. Produces 40–90 culms per plant, 3–5 feet tall, 1/16–5/16 inch in diameter. Self-fertile and good seed producer. May be cut at least twice per season.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Mississippi Agricultural Experiment Station.

### PERENNIAL SWEET

Selected at Substation 8, Lubbock, Tex.—R. E. Karper.

*Source.*—In 1941 L. F. Randolph, New York Agricultural Experiment Station, Ithaca, doubled chromosome number of common sudangrass with colchicine and crossed this tetraploid with johnsongrass. Seed of this hybrid sent to Substation 8, Lubbock, for further study.

*Method of Breeding.*—Progeny selections grown for several years, but appeared too early and unproductive. Few selections retained their seed well; these persistent types grown in 1945 surrounded by Sweet sudangrass. Three natural outcrosses with Sweet sudangrass recovered in 1946. Selection continued for sweet juicy stalks, good fertility, seed yield, and perennial rooting habit intermediate between johnsongrass and sudangrass.

*Description.*—Synthetic tetraploid (4n) that would be expected to cross freely with johnsongrass, but not likely to cross with other sorghums. Rootstalks short and thick, more weakly perennial, not so difficult to eradicate as johnsongrass. More likely to be profitable when handled as annual. As palatable as Sweet sudangrass. Seed similar to that of Sweet sudangrass; glumes predominantly chocolate or mahogany in color; seeds persistent. Plant mostly tan.

*Released.*—1957, by Substation 8, Lubbock.

*Breeder Seed.*—Substation 8, Lubbock.

*Certified Seed.*—Available.

### SORGHUM ALMUM

Introduced into United States from Argentina, Union of South Africa, Australia, and New Zealand. Grown at Substations 8 and 12 at Lubbock and Chillicothe, Tex., respectively, since mid-40's, and collection from Argentina received by Georgia Agricultural Experiment Station, Athens, in 1949. Major source of seed in United States traces to seed

lots obtained from Australia and New Zealand in 1952. Commonly referred to as columbusgrass in Union of South Africa.

*Source.*—First described by Lorenzo R. Parodi in 1943. He received seed in 1936 from A. Ragonese, agronomist, Province of Santa Fe, Argentina. Parodi concluded grass must have originated under cultivation as hybrid between johnsongrass and some other introduced sorghum (*Sorghum vulgare*). Records indicate material grown in Union of South Africa, Australia, and United States traces to seed lots that had origin in Argentina. ( $2n=40$ .)

*Description.*—Tall, robust, rather closely resembling johnsongrass in many ways. Coarser, larger

stems, often wider leaves, and generally grows taller than johnsongrass. Heads longer, lax, more spreading, with more branches at whorl. Rhizomes stout, short, and turn up close to crown. No difficulty experienced in killing it out by plowing. Seed shatters very readily. Although seed somewhat larger than that of johnsongrass, difficult to identify it in intermediate range. Some crossing could be expected to occur with johnsongrass. Sorghum Almus accessions exhibit wide range in plant type; some lots more uniform than others. Prussic acid potential equivalent, for most part, to that of johnsongrass.

*Certified Seed.*—Not available. (Ample supplies of commercial seed.)

### ***Sorghum sudanense* (Piper) Stapf, sudangrass**

Major warm-season annual introduced from Africa in 1909. Used for pasture, silage, soiling, and hay throughout much of United States, but not well adapted to sandy Coastal Plain in South or to regions where summers are relatively cool. Palatable and nutritious; some varieties high in prussic acid. Grows best on fertile soils; drought resistant. Relative importance of sudangrass may be affected by success of sorghum  $\times$  sudangrass hybrids.

#### **BELTSVILLE SYNTHETIC 4**

Selected at Plant Industry Station, Beltsville, Md.—J. P. Trimble.

*Source.*—Disease-resistant lines isolated by C. L. Lefebvre.

*Method of Breeding.*—First-generation hybrid produced by planting mixture containing equal amounts of live seed of four inbred lines.

*Description.*—Coarse, vigorous, high yielding; good level of disease tolerance. Prussic acid content high.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Discontinued.

#### **CALIFORNIA 23**

Selected at Imperial Valley Field Station, El Centro, Calif.—L. G. Goar.

*Source.*—Common sudangrass.

*Method of Breeding.*—Selected from common sudangrass in early 1930's; reselected at Davis, Calif., to eliminate black seed and other offtypes.

*Description.*—Little later in heading and more uniform than common sudangrass; somewhat taller and more vigorous growth. Yielded 10–20 percent more than common or Sweet sudangrass at California Agricultural Experiment Station, Davis. Susceptible to leaf diseases when grown under humid conditions.

*Released.*—1938, by California Agricultural Experiment Station.

*Breeder Seed.*—California Agricultural Experiment Station.

*Certified Seed.*—Available.

#### **COMMON (GARAWI)**

Introduced into United States in 1909.

*Source.*—Probably native of upper Egypt; cultivated near Khartoum under name "garawi," but it may have originated farther south in Africa.

*Description.*—Several strains of sudangrass developed from early introductions; similar in type, being extremely early and susceptible to disease.

*Released.*—Informally by USDA and State agricultural experiment stations in early 1900's.

*Certified Seed.*—Some local strains certified. (Ample commercial supplies.)

#### **GEORGIA 337**

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—Developed from intercrossing and selection of material tracing its parentage to Tift sudangrass, McLean sorghum, and lines low in prussic acid from Wisconsin Agricultural Experiment Station, Madison.

*Method of Breeding.*—Disease resistance of Tift and low prussic acid content of Wisconsin material combined by hybridization and screening  $F_2$  populations. This material crossed with McLean sorghum for broad leaves, disease resistance, juiciness, and sweet stalk. Selected  $F_2$ 's recombined several times to bring together desired characteristics. Usually 1,000 or more  $F_2$ 's tested in  $F_3$  generation in single-row plots between rows of common and Tift. Finally,  $F_2$  plant breeding true for desired traits in  $F_3$  increased in isolation.

*Description.*—Excellent disease resistance, sweet juicy stalks, wide leaves, low prussic acid content. Uniform straw-colored seedcoat. Late maturing. Often outyields other varieties during long growing seasons; shown great yield potential under irrigation. Its disease resistance gives it dependability and quality lacking in some varieties during heavy disease epidemics.

*Released.*—1964, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

### GREENLEAF (Reg. No. 105)

Selected at Kansas Agricultural Experiment Station, Manhattan—R. C. Pickett.

*Source.*—Advance generation backcross of common sudangrass × Leoti Red sorghum received in 1940 from Substation 12, Chillicothe, Tex. After several generations of selection, composite group of selected lines bulked for increase in 1951.

*Method of Breeding.*—Selection for several generations in cross of sudangrass × sweet sorghum.

*Description.*—Juicy stalk; tall, fairly coarse, vigorous, leafy, freely tillering, late maturing; tan glume (from Leoti parent). High degree of resistance to leaf diseases. High forage yields.

*Released.*—1953, by Kansas Agricultural Experiment Station.

*Breeder Seed.*—Kansas Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### LAHOMA (Reg. No. 108)

Selected at Oklahoma Agricultural Experiment Station, Stillwater—W. C. Elder.

*Source.*—Breeding materials received from Substation 12, Chillicothe, Tex., in 1948.

*Method of Breeding.*—Selected from progeny row that remained in vigorous growing condition after other entries had succumbed to drought and severe chinch bug infestation. Distributed for testing as Oklahoma 130.

*Description.*—Wide leaved, late maturing, drought enduring. Very uniform in growth habit, tillers well. Distinctive yellow-green leaf. Good seed producer; seed ranges in color from apricot to sienna. Leaf diseases may be troublesome when moisture excessive. No more prussic acid than other sweet types.

*Released.*—1954, by Oklahoma Agricultural Experiment Station.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

*Certified Seed.*—Available in limited quantity.

### OKLAHOMA 8

Selected at Oklahoma Agricultural Experiment Station, Stillwater—C. E. Denman.

*Source.*—F<sub>2</sub> population of Piper × Lahoma.

*Description.*—Common type; rather juicy and intermediate between two parents in leafiness, maturity, and tillering. Disease reaction similar to that of Lahoma. Seed color sienna; leaves as wide as those of Lahoma.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Oklahoma Agricultural Experiment Station.

### PIPER

Selected at Wisconsin Agricultural Experiment Station, Madison—D. C. Smith.

*Source.*—Tift and lines obtained from Substation 12, Chillicothe, Tex., and Kansas Agricultural Experiment Station, Manhattan.

*Method of Breeding.*—Resulted from series of crosses among lines low in prussic acid, Tift, and Texas selection, followed by repeated testing and selection. Last cross made in 1942.

*Description.*—Low in prussic acid potential, vigorous, resistant to leaf blight and anthracnose at northern locations. Mixed as to seed color, with both light- and dark-colored seeds. Early variety. Most of stalks dry.

*Released.*—1950, by Wisconsin Agricultural Experiment Station.

*Breeder Seed.*—Wisconsin Agricultural Experiment Station.

*Certified Seed.*—Available in quantity.

### STONEVILLE SELECTION

Selected at Delta Branch Experiment Station, Stoneville, Miss., ARS cooperating—H. W. Johnson and P. G. Hogg.

*Source.*—Sudangrass × sorghum selection resistant to *Helminthosporium turcicum* (seed obtained in 1947 from C. L. Lefebvre, Beltsville, Md.) and sorgo introduction from Africa (Mn 1054) resistant to zonate leaf spot and rust (seed obtained in 1950 from O. H. Coleman, Meridian, Miss.).

*Method of Breeding.*—Cross made in greenhouse in winter of 1951 and F<sub>1</sub> grown in field that year. Selfing started in F<sub>2</sub> generation and continued until 1960.

*Description.*—Increase of open-pollinated seed of F<sub>4</sub> line from above cross. Seed of this selection produced in isolated block at Stoneville in 1956 and 1962. Selection remains green in field plantings until late summer, when it may become spotted with gray leaf spot. Plant size intermediate between sudangrass and sorgo. High yield potential. Juice sweet.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Delta Branch Experiment Station.

### STONEVILLE SYNTHETIC 1

Selected at Delta Branch Experiment Station, Stoneville, Miss., ARS cooperating—H. W. Johnson and P. G. Hogg.

*Source.*—Sudangrass × sorghum selection resistant to *Helminthosporium turcicum* (seed obtained in 1947 from C. L. Lefebvre, Beltsville, Md.) and sorgo introduction from Africa (Mn 1054) resistant to zonate leaf spot and rust (seed obtained in 1950 from O. H. Coleman, Meridian, Miss.).

*Method of Breeding.*—Cross made in greenhouse in winter of 1951; F<sub>1</sub> grown in field that year. Selfing started in F<sub>2</sub> generation and continued until 1960.

*Description.*—Increase of mixed, open-pollinated seed of two F<sub>4</sub> lines from above cross. Seed of this synthetic produced in isolated block at Stoneville in 1956 and 1960. Synthetic remains green in field plantings until late summer, when it may become spotted with gray leaf spot. Plant size intermediate between sudangrass and sorgo. High yield potential. Juice sweet.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Delta Branch Experiment Station.

### STONEVILLE SYNTHETIC 2

Selected at Delta Branch Experiment Station, Stoneville, Miss., ARS cooperating—H. W. Johnson and P. G. Hogg.

*Source.*—Sudangrass × sorghum selection resistant to *Helminthosporium turcicum* (seed obtained in 1947 from C. L. Lefebvre, Beltsville, Md.) and sorgo introduction from Africa (Mn 1054) resistant to zonate leaf spot and rust (seed obtained in 1950 from O. H. Coleman, Meridian, Miss.).

*Method of Breeding.*—Cross made in greenhouse in winter of 1951; F<sub>1</sub> grown in field that year. Selfing started in F<sub>2</sub> generation and continued through F<sub>8</sub> in 1960.

*Description.*—Increase of mixed, selfed seed of 14 F<sub>8</sub> sister lines from above cross. Seed of this synthetic produced in isolated blocks at Stoneville in 1962 and 1963 (3,880 pounds from 1.1 acres in 1963). Synthetic remains green in field plantings until late summer, when it may become spotted with gray leaf spot (*Cercospora*). Plant height approximately 6 feet, permitting direct combining of seed. Plant stems like those of sudangrass, but broader, sorghumlike leaves. Juice sweet. Suitable for grazing or silage, with high yield potential.

*Released.*—No. Included in regional testing program.

*Breeder Seed.*—Delta Branch Experiment Station.

### SWEET 372 (Reg. No. 92)

Selected at Substation 12, Chillicothe, Tex., ARS cooperating—J. R. Quinby, R. E. Karper, and J. C. Stephens.

*Method of Breeding.*—Mixture of strains selected from intercrosses between strains selected from cross between sudangrass and Leoti sorghum. Selected strains all unusually palatable to cattle.

*Description.*—Similar to common sudangrass, except stems juicy and sweet and glumes sienna in color. Plants grow 3–8 feet tall and tiller freely. Stems less than one-half inch in diameter; leaves long and narrow. Forage yield slightly above that of common sudangrass, but increase in weight due to higher seed production.

*Released.*—1943, cooperatively by Substation 12, Chillicothe, and Crops Research Division, ARS.

*Breeder Seed.*—Substation 12, Chillicothe.

*Certified Seed.*—Available in quantity.

### SWEET 372(S1)

Selected by J. R. McNeill Seed Co., Spur, Tex.—J. R. McNeill.

*Source.*—Single-plant selection from field of registered Sweet 372 sudangrass.

*Method of Breeding.*—Seed of this and other selections planted in isolated blocks on dry land having good underground moisture. Only two of these seemed superior; only that designated S1 (selection 1) increased.

*Description.*—Single-strained selection from Sweet 372; synthetic composed of multiple strains. Plants fine stemmed, free tillering, with peduncles that recurve under weight of heads. Seed covered by dense sienna glumes; glabrous and glossy. Seedling vigor good. Maturity 3–5 days earlier than average of Sweet 372 sudangrass in High Plains area of Texas.

*Released.*—Distributed by J. R. McNeill Seed Co.

*Breeder Seed.*—J. R. McNeill Seed Co.

*Certified Seed.*—Available in quantity.

### TENNESSEE SYNTHETIC 1

Selected at Tennessee Agricultural Experiment Station, Knoxville—J. K. Underwood.

*Source.*—Selected from California 23 sudangrass with degree of disease resistance, Leoti sweet sorghum, and Piper sudangrass.

*Method of Breeding.*—Selections SG 1–16, 2–7, and 3–7 from cross (California 23–17 × Leoti sweet sorghum) × (California 23–17 × Piper su-

dangrass) combined to make Synthetic 1. Synthetic 1 in its sixth generation (1957-63).

*Description.*—Vigorous. High forage yields, maintaining resistance to leaf spot; good leafy quality; prussic acid content low. Seed color variable, from brown, reddish purple, to black; caryopsis brownish.

*Released.*—No. Distributed for regional testing.

*Breeder Seed.*—Tennessee Agricultural Experiment Station.

#### TIFT (Reg. No. 95)

Selected at Georgia Coastal Plain Experiment Station, Tifton, ARS cooperating—Glenn W. Burton.

*Source.*—Developed from hybridization program involving common sudangrass and Leoti sorghum.

*Method of Breeding.*—Disease-resistant plants in some 35,000 F<sub>2</sub>'s of cross between common sudangrass and Leoti sorghum backcrossed to sudangrass. Thirty thousand F<sub>2</sub>'s from these backcrosses gave superior individual that bred true for disease resistance and uniform enough in other characteristics to permit its increase in isolation and its release as Tift.

*Description.*—Mixture of chocolate and tan-colored seeds; basic tan plant color; fine stemmed and leafy. Resistant to *Colletotrichum graminicolum*, *Helminthosporium turcicum*, bacterial stripe, and bacterial streak. Somewhat later maturing than other sudangrass varieties. During heavy disease epidemics produces more forage of higher quality for longer period of time than disease-susceptible varieties.

#### *Sorghum vulgare* var. *drummondii* (Nees) Hack. ex Chiov., chicken corn

*Source.*—Seed collected near Epes, Ala., by W. C. Young in August 1939 from naturalized stand. This species introduced apparently by accident in Black Belt of Alabama about 1860; became widespread few years later. Practically disappeared as naturalized plant. Tested as SC 26-104.

*Description.*—Wild sweet sorghum of medium size. Bears seed that shatters soon after maturity,

*Released.*—1943, cooperatively by Georgia Coastal Plain Experiment Station and Crops Research Division, ARS.

*Breeder Seed.*—Georgia Coastal Plain Experiment Station.

*Certified Seed.*—Available in limited quantity.

#### WHEELER

Selected by Carl Wheeler, Bridgeport, Kans.

*Source.*—Seed received from USDA in about 1911.

*Description.*—Early strain of common sudangrass. In general, taller and higher yielding than most common strains. Not very leafy. Susceptible to disease. Prussic acid potential comparable to that of common types.

*Released.*—1915, by Carl Wheeler.

*Breeder Seed.*—Not available.

*Certified Seed.*—Available in quantity.

#### WILD SUDAN

*Source.*—Seed collected by Paul Tabor in 1945 from naturalized stand at Clewiston, Fla. Tested as SC 20-833. *Sorghum* sp.

*Description.*—Annual; similar to sudangrass in appearance. Seed shatter soon after maturity, remains sound for some time, volunteers freely. Extensively naturalized in Everglades area just south of Lake Okeechobee in Florida. Susceptible to leaf and stem diseases; resistant to drought.

*Released.*—Distributed by SCS Nursery, Thorsby, Ala., in 1950.

*Breeder Seed.*—Plant Materials Center, SCS, Americus, Ga.

*Certified Seed.*—Not available.

remains sound over winter, germinates following spring and summer. Used in wildlife plantings.

*Released.*—Distributed by SCS Nursery, Thorsby, Ala., in 1950.

*Breeder Seed.*—Plant Materials Center, SCS, Americus, Ga.

*Certified Seed.*—Not available. (Limited commercial supplies.)

#### *Sorghum vulgare* Pers. × *S. sudanense*, sorghum × sudangrass hybrids

Important warm-season annuals developed by crossing cytoplasmic male-sterile sorghum lines with improved varieties of sudangrass. Used for silage, soiling, and pasture in Great Plains and Southern United States. Commercial varieties available. High forage yields; varieties vary in recovery under rotational grazing or frequent

mowing, in quality, and in prussic acid potential. Many varieties may eventually be replaced by hybrids produced on male-sterile sudangrass lines.

#### SUHI 1 (Reg. No. 110)

Developed at Georgia Agricultural Experiment Station, Experiment—J. P. Craigmiles.



*Source.*—Male-sterile Rhodesian grass (*Sorghum arundinaceum* (Wild.) Stapf) developed from P.I. 156549 and Tift sudangrass.

*Method of Breeding.*—Seed produced by controlled pollination between male-sterile Rhodesian grass and Tift pollinator. Good pollination obtained with three rows of male-sterile alternated with each row of pollinator. Seed yield somewhat erratic.

*Description.*—Wide leaves, rather dry stems, and good level of disease resistance. At maturity

dark seeds have reddish-brown to black glumes. Good seedling vigor, rapid regrowth, and extreme height (8 to 12 feet) when allowed to mature. Adapted in most areas where sudangrass is grown. High prussic acid potential; should be grazed with caution.

*Released.*—1961, by Georgia Agricultural Experiment Station.

*Breeder Seed.*—Georgia Agricultural Experiment Station.

*Certified Seed.*—Limited availability.

### ***Sporobolus airoides* (Torr.) Torr., alkali sacaton**

Native bunchgrass found from Washington and South Dakota south into Mexico. Abundant in parts of Southwest on lower alkaline flats; also grows on rocky soils and open plains; tillers extensively on moist sites. Grazes well during growing season; unpalatable when mature and not good as winter forage.

#### **PM-C-14**

Increased at Plant Materials Center, SCS, Los Lunas, N. Mex., and New Mexico Agricultural Experiment Station, University Park, cooperating.

*Source.*—Collected from very adverse site west

of Pueblo, Colo., at elevation of 4,800 feet and precipitation about 12 inches annually.

*Method of Breeding.*—Increased under isolation. First-generation material further increased to provide seed for field testing.

*Description.*—Superior characteristics in row comparisons. Per-acre yields of seed from increase blocks averaged higher than two other numbers in production. Limited field testing shows wide adaptability and fair seedling establishment under natural rainfall conditions.

*Released.*—No.

*Breeder Seed.*—Plant Materials Center, SCS, Los Lunas.

### ***Sporobolus cryptandrus* (Torr.) A. Gray, sand dropseed**

Native bunchgrass widely distributed in United States; common in western ranges and important in Southwest and parts of Oregon and Idaho. Adapted to sandy soils. Low palatability; fair

winter herbage. Prolific seeder that increases on depleted range under proper grazing or protection. Varieties not available.

### ***Sporobolus wrightii* Munro ex Scribn., sacaton**

Native bunchgrass occurring from Arizona to western Texas and south into Mexico. Useful for grazing when young, furnishes hay and good winter grazing, especially on alluvial flats and bottom

lands. Robust; larger than alkali sacaton and more exacting in its water requirement. Varieties not available.

### ***Stenotaphrum secundatum* (Walt.) Kuntze, St. Augustine grass**

Warm-season, sod-forming grass indigenous in West Indies and common in tropical Africa, Mexico, and Australia. Used primarily as lawn grass from Florida to eastern Texas and to limited extent for pastures on muck soils. Subject to winterkilling north of Augusta, Ga., and Birmingham, Ala. Grows best on relatively fertile, well-drained soils; tolerates shade. Subject to chinch bug damage. Propagated vegetatively.

#### **BITTER BLUE**

Selected originally from Florida lower east coast.

*Source.*—Originally selected by tradesman. Stories conflicting as to just who selected variety and as to original source. Variety known and widely used in commerce in Florida for over 25 years. Brisk demands for St. Augustine grass sod brought about widespread misuse of name and

misidentity of improved variety with common and pasture-type St. Augustine grass. Selections from several sources under test at Florida Agricultural Experiment Station, Gainesville.

*Method of Breeding.*—Not known, but surmised to be natural selection.

*Description.*—Improved variety with closer internodes, shorter, more narrow leaves, greater leaf density, and closer growing habit than common type. Attractive blue green, good shade tolerance, frost resistance. Does not tolerate continuous wear; hence best adapted for ornamental turf.

*Released.*—Never officially.

*Breeder Stock.*—Not available.

*Certified Stock.*—Not available. (Available commercially.)

### FLORATINE

Selected at Florida Agricultural Experiment Station, Gainesville—Roy A. Bair and Gene C. Nutter.

*Source.*—Selected originally in 1950 from southern Florida and evaluated at Belle Glade, Fla.; vegetative material moved to Gainesville in 1953.

*Method of Breeding.*—Natural selection (probably a seedling from Bitter Blue).

*Description.*—Low growing, fine textured, and attractive blue green. Stolons branch prolifically, producing dense turf of short (1½ inches) and narrow (1⅜ inch) leaves; average internode length 1.8 inches as compared with 2.0 inches for Bitter Blue and 3.0 inches for common. Average maximum unmowed height in test plots 4.3 inches compared with 5.0 inches for Bitter Blue; tolerates close mowing and has survived at one-half inch. Rate of coverage and other characteristics similar to those of Bitter Blue.

*Released.*—1959, by Florida Agricultural Experiment Station.

*Breeder Stock.*—Florida Agricultural Experiment Station.

*Certified Stock.*—Available.

### *Stipa comata* Trin. and Rupr., needle-and-thread

Cool-season, native bunchgrass. Widely distributed over most of Western United States; common on dry, sandy, or gravelly sites. Relatively coarse; leaves toughen rather early, but forage

value fair to good early in season and after seeds drop. Sharply pointed seeds with long, barbed awns may cause mechanical injury, especially to sheep. Varieties not available.

### *Stipa hyalina* Nees

#### T-20258

Increased at SCS Nursery, San Antonio, Tex.—James E. Smith, Jr.

*Source.*—Introduced from Pergamino, Argentina, as P.I. 197867, BN-7440. Tested as T-20258.

*Method of Breeding.*—Observational tests.

*Description.*—Leafy, perennial bunchgrass, with light-green foliage. Heavy seed producer. Stems about 30 inches tall under dryland cultivation; often 5-6 feet tall under irrigation and at

seed maturity. Plants continue active growth longer in spring than native *Stipa leucotricha* Trin. and Rupr. Seed small, about ⅜ inch long; blunt callus; very slender awn about 1¼ inches long. Volunteers aggressively against such competition as irrigated blue buffelgrass and johnsongrass.

*Released.*—No. Included in observational plantings.

*Breeder Seed.*—Plant Materials Center, SCS, San Antonio.

### *Stipa pulchra* Hitchc., California needlegrass (purple needlegrass)

Cool-season, native bunchgrass found primarily in California. Used for grazing in spring and summer; cures well on stem; rated high in forage

value, but awns may be troublesome to sheep. Varieties not available.

### *Stipa viridula* Trin., green needlegrass

Cool-season, native bunchgrass found from Wisconsin to Montana and south to New Mexico.

Valuable in northern Great Plains, Wyoming, and Colorado. Palatable and nutritious. Starts

growth relatively early and remains green until late in season.

### GREEN STIPAGRASS (Reg. No. 2)

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Collected near Mandan in 1935.

*Method of Breeding.*—Single-plant selection from above source; progeny tested, increased, and distributed as Mandan 397.

*Description.*—Superior to common green needlegrass in forage and seed yields, improved seedling, and regrowth characteristics.

*Released.*—1946, cooperatively by North Dakota Agricultural Experiment Station, Fargo, and Crops Research Division, ARS.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

*Certified Seed.*—Available in quantity.

### MANDAN 2611

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—G. A. Rogler and H. M. Schaaf.

*Source.*—Bulk collection made in native stand north of Bismarck, N. Dak., in 1935.

*Method of Breeding.*—Recurrent selection for low seed dormancy for three generations within spaced-plant progenies of promising lines.

*Description.*—Superior to Green Stipagrass in level of dormancy exhibited by newly harvested seed and comparable in forage and seed yields.

*Released.*—Will probably be named (Lodorm) and released cooperatively by several Northern Great Plains States and Crops Research Division, ARS, in 1965.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

*Certified Seed.*—Available in limited quantity in 1964.

### *Stipa viridula* × *Oryzopsis hymenoides*

#### MANDAN RICEGRASS

Selected at U.S. Northern Great Plains Field Station, ARS, Mandan, N. Dak.—George A. Rogler.

*Source.*—Amphidiploid of natural cross of *Stipa viridula* and *Oryzopsis hymenoides*. F<sub>1</sub> hybrid occurred in nursery at Mandan in 1941; fertile F<sub>2</sub> plant found in 1945.

*Method of Breeding.*—Natural intergeneric hybridization followed by spontaneous chromosomal doubling.

*Description.*—Morphologically intermediate between two parent species, with growth habit more closely approaching that of *O. hymenoides*.

*Released.*—No. Distributed for testing.

*Breeder Seed.*—U.S. Northern Great Plains Field Station.

### *Zoysia japonica* Steud., Japanese lawngrass

Warm-season, sod-forming grass from Asia. Used for general-purpose turf and erosion control in Southeastern United States. Relatively winter hardy, but does not thrive or compete well where summers are short or cool. Grows best on heavy soils; not drought resistant. Relatively coarse and tough. Produces seed, but generally planted vegetatively.

#### BELTSVILLE SELECTIONS

Selected at Plant Industry Station, Beltsville, Md.—F. V. Juska and A. A. Hanson.

*Source.*—Selections from old nurseries; seed harvested from Meyer and various introductions.

*Method of Breeding.*—Selection for early-spring and late-fall color practiced in areas planted with open-pollinated seed and in nurseries established with irradiated seed. Open-pollinated and F<sub>1</sub> seed, produced in greenhouse, used to establish space-planted progeny tests. Individual plants increased vegetatively for evaluation under mowing.

*Description.*—

Beltsville 21-15(12).—Slow spread, dark green, fine leaves, rapid spring growth, and excellent color retention in fall.

Beltsville 21-15(24).—Good spread, apple-green color, good to excellent spring and fall color.

Beltsville 52-22(24).—Rapid spread, lighter green and wider leaves than Meyer, excellent color retention in fall.

*Released.*—No. Distributed for testing in 1964.

*Breeder Stock.*—Plant Industry Station.

#### MEYER

Selected at Arlington Farms, Va., and Plant Industry Station, Beltsville, Md., in cooperation with U.S. Golf Association Green Section—Ian Forbes, Marvin H. Ferguson, and Fred V. Grau.

*Source.*—Japanese lawngrass (*Zoysia japonica* Steud.) seed introduced in 1930 from northern Korea. *Z. japonica* known to have been in United States in 1895.

*Method of Breeding.*—Promising individual plant selected at Arlington Farms in 1940. Vegetative material moved to Beltsville in 1941; increased for testing in 1947–48 as Z-52.

*Description.*—Develops tough, wear-resistant turf. Leaf width intermediate between that of *Z. matrella* (L.) Merr. and *Z. japonica*. Drought resistant, but will turn brown during long, dry periods. Grows and persists on relatively poor soils. Rate of spread and color improved by applications of fertilizer and irrigation. Competes very satisfactorily with weeds and other grasses in areas where adapted. Competition from other species increases time required to attain complete coverage. Winter hardy, but in general only recommended in areas with long, warm growing season. Warm-season grass; becomes dormant and brown with first frost in fall.

*Released.*—1951, cooperatively by Crops Research Division, ARS, and U.S. Golf Association Green Section. Name "Meyer" honors memory of Frank N. Meyer, USDA plant explorer.

*Breeder Stock.*—Plant Industry Station, Beltsville.

*Certified Stock.*—Available. (Ample commercial stock.)

#### MIDWEST

Selected at Indiana Agricultural Experiment Station, Lafayette—W. H. Daniel and W. C. LeCroy.

*Source.*—Open-pollinated seedling nursery representing 40 sources.

*Method of Breeding.*—Selected as preferred in-

dividual plant from over 3,000 seedlings in 6-year testing program.

*Description.*—Medium green, vigorous; faster spreading and with wider leaves than Meyer. Turf open, not excessively fluffy and easy to walk on. Color retained 2–3 weeks longer in fall and green appears 1–2 weeks earlier in spring than Meyer.

*Released.*—1963, by Indiana Agricultural Experiment Station.

*Breeder Stock.*—Indiana Agricultural Experiment Station.

*Certified Stock.*—Available.

#### Z-73

Selected at Plant Industry Station, Beltsville, Md., in cooperation with U.S. Golf Association Green Section—Fred V. Grau.

*Source.*—Meyer zoysia.

*Method of Breeding.*—Single-plant selection from plants grown from seed produced on Meyer zoysia.

*Description.*—Vigorous, relatively fast spreading. Leaf width intermediate between that of Meyer and common *Zoysia japonica*. Winter hardy. Produces good seed yields; seed heads golden tan. Appears to be less competitive to Kentucky bluegrass than Meyer. Suggested for use in erosion control and on large lawns and highways. Proposed name, "Sunburst."

*Released.*—No. (Seed from Z-73 distributed in 1952.)

*Breeder Stock.*—National Plant Materials Center, SCS, Beltsville.

### *Zoysia japonica* × *Z. tenuifolia* Willd. ex Trin.

#### EMERALD (Reg. No. 7)

Selected at Plant Industry Station, Beltsville, Md.—Ian Forbes.

*Source.*—Selected from several F<sub>1</sub> hybrids between *Zoysia matrella* varieties *japonica* and *tenuifolia*. *Z. japonica* parent introduced from Korea and *Z. tenuifolia* parent from Agricultural Experiment Station at Guam.

*Method of Breeding.*—Hybrids made in all possible combinations between varieties *japonica*, *matrella*, and *tenuifolia*. Selection in F<sub>1</sub> based on turf quality (leaf width, density, color, growth habit) and winter hardiness. Tested as experimental 34–35.

*Description.*—Vegetatively propagated F<sub>1</sub> hybrid (*Z. matrella* var. *japonica* × *Z. matrella* var. *tenuifolia*). In comparison with varieties *japonica*,

*matrella*, *tenuifolia*, and Meyer zoysia at Beltsville and at Tifton, Ga., Emerald had best total turf-quality score at both locations for 3 years. Combined to varying degrees greater winter hardiness, nonfluffy growth habit, and faster rate of spread of its *japonica* parent with finer leaves, denser turf, and dark-green color of its *tenuifolia* parent. Exhibited hybrid vigor in rate of spread, browning, and density ratings. Considerably more shade and frost tolerant than bermudagrass.

*Released.*—1955, cooperatively by Georgia Agricultural Experiment Station, Tifton; Crops Research Division, ARS; and U.S. Golf Association Green Section.

*Breeder Stock.*—Georgia Coastal Plain Experiment Station.

*Certified Stock.*—Available in quantity.

***Zoysia matrella* (L.) Merr., manilagrass**

Warm-season, sod-forming grass introduced from Asia. Used as lawngrass in Southeastern United States. Finer, denser sod and less winter hardy than *Zoysia japonica*.

**F.C. 13521**

Increased at Alabama Agricultural Experiment Station, Auburn.

*Source*.—Received from H. N. Vinall in 1927. F.C. 13521 obtained originally from J. B. Norton, Hartsville, S.C.; probably selection from S.P.I. 48574.

*Description*.—Fine, dark green. Leaf blades usually 3–5 inches long when not mowed. Grows very dense. Produces creeping stolons that root profusely; ends of stolons cling to ground and thus grow under competing plants. Stands considerable shade. Produces seed heads and some seed in spring. Rather free from diseases and insects. Susceptible to drought, but will recover rapidly when moisture becomes available.

*Released*.—Alabama Agricultural Experiment Station.

*Breeder Stock*.—Alabama Agricultural Experiment Station.

*Certified Stock*.—Available.

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Troy	84	Z-73	96
Tualatin	25	<i>Zoysia japonica</i>	95
Tucson	27	× <i>Z. tenuifolia</i>	96
Tufcote	44	<i>matrella</i>	97
Turkish	3		







